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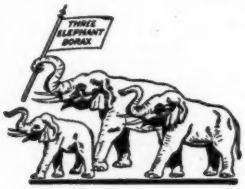


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# Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Editor*

*Editorial Office:* 1155 16th Street, N. W., Washington 6, D. C.

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"AND ON EARTH PEACE, GOOD WILL TOWARD MEN!"

Better Crops with PLANT FOOD

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*Anticipating . . .*

# Anti-Acre Aches

Jeff McDermid

WHEN we are under the mellow influence of Christmas it's time to watch out for benevolent blundering, a good time to see that our sentiment doesn't run away with our sense, or that we don't try to pay taxes with tinsel and thus invite aching acres in 1950 by beckoning all the boys back to hustle for happiness on the old homestead.

We all must admit to a certain carefree mental jag at holiday time, a tendency to let the programs of the year ahead glimmer away in a wave of generosity, and to take all things at their outward face value, like Santa Claus' whiskers. It's a fine old American trait, but the trouble is we often let it fool us all the rest of the year, and overlook the fact that a Christian can also be careful, considerate, and cautious.

This is especially apt to happen when we have an empty chair or two in the circle, and the absent ones are delving in unaccustomed industry or facing danger in unknown lands. In our anxiety to have them back among us in old haunts and following old habits, we like fairy tales better than facts.

From time immemorial the good earth and its husbandry have been the refuge for the "forgotten man." It has been the place of last resort, the wondrous rainbow's end in a deluge, the retiring spot for the escapist and the incompetent, and the promising shelter for victims of economic unrest.

Because so much of the best and soundest aspects of living have sprung from close communion with nature and under the vine and figtree of the family-sized farm, we allow ourselves to get maudlin and lush with starry-eyed faith in the soil as a sure-fire cure for what ails us in a world out of joint.

Ergo, we say to ourselves, if a food or a medicine is so helpful, let's all gather around and take more of it!

This attitude has been traditional in American thinking and disregards the gradual way in which general opportunity on the farm has been hedged in and circumscribed by the growth and spread of technical progress and mechanical ingenuity in the old art of filling the human belly.

YOUR standard Christmas card depicting human cheer and comfort and content has been decorated with ruddy rural doorways, jolly family reunions, cozy hearthstones, laden larders, and gravy galore—always the horn of plenty, but never the horn of dilemma. When all else fizzled out, the farm was functioning, the goose hung high, the calf was milk-fat, and the poor prodigal was once more the home-bound hero.

Anybody who dared to intimate that maybe the farmer should be licensed to practice on his ability and his equipment and soil resources, just like the dentist or the veterinarian, was never popular as a rural prophet. No siree! Let the freedom of our national life be reflected and upheld by giving everybody a chance to push the plow, yank the teat, and slop the hog. Training and education and basic soil culture were things to be sought after all the hopes and joys and jags of bucolic blessedness were realized. The guy with a hoe had as much right to dig for dollars in the dirt as the man with the pickax to crack the rocks for gold. The only thing that's wrong nowadays is that hoes and pickaxes are so darn far behind as modern tools of achievement!

That kind of mechanical effort belonged to the dead days of yore when it took eight families tilling the farm to keep themselves and only two families in town eating three squares daily. Of course, if we grab hold of that temporarily silly notion so current these days that the destiny of American farms is to keep on shipping provisions to Europe, Asia, and the Isles of the Sea, then maybe we'd go right back to those good old days awhile and keep the balance of our manpower busy in the furrow. But anybody who has ordinary hoss sense can figure out that by 1950 we will be in a normal state again in regard to foreign demand and the home-grown surplus, unless old Hitler and Hirohito hold out longer than we think.

Then by gravy, there's still another poser for you. Back when the walking plow and the pitchfork ruled our farms, the boys and girls somehow never had the strange yen for fancy luxuries and slap-dab fixings in the home and on the ranch like most of them insist on buying now. That means either fetching the kids all home to take a chance on being bereft of the gadgets they want to make life cozy, or else letting them go mail-order haywire and trust city industry to pay their help so they can eat twice as much as they want to, so the farm folks can pay the freight both ways. In either case you've got to have livestock to make manure or else buy mixed minerals galore, and it hurts both ways if you haven't got a good market handy.

But I don't want to forget our "forgotten man" I mentioned a bit ago. He's being forgot so much it's no wonder I almost missed him in branching off a little in my essay. So bend closer to the mazda and follow along in this mess until you begin to see what I am aiming at. We mustn't allow him to sneak back on the farm to starve while we indulge in rhetoric.

TWO cases that prove nothing for future results come to my attention, but both are typical of what may be expected as fast as the soldiers and sailors return to old communities. Each carries its own question mark, insofar as depending on agriculture for a haven after war's shattering abuse.

First, take the boy, Darrell, who worked out on farms more or less be-

fore his enlistment in the marines. He was in the thick of the New Georgia Island campaign, where he suffered brain concussion from a Jap shell explosion. Upon his discharge the home doctor recommended the farm as a place to recuperate and be free from loud noise and confusion. His mustering-out pay was all the cash assets Darrell had and local finance concerns were unable to get him located on a farm. Thereupon through the FSA agency he rented a 70-acre place and with a loan of $2,500 got 15 cows, a team with harness, feed and seed, and some tools.

His father and mother came to live with him last spring. He got a late start but planted about 10 acres of corn, 18 acres of oats, and 6 acres of potatoes for a cash crop. He has had a slight setback with malaria fever, but fresh country living is more likely to curb that than a confining job in town, he says. He gets his $50 monthly pension money and with this he hopes to tide himself along until health returns and a normal season comes. He leans toward pure-bred cattle and says he wants blue ribbons on them to match his service ribbons in the war. Well, let's hope he will and trust to nature and weather and government price supports, as well as more loans, probably, to pull him along.

The second case is unlike the first because this time an elderly couple born in Poland are alone on the 80-acre place with only 40 acres cleared, and with five boys and two girls in the active services. The Missus says she is just a thankful old lady working hard and praying for the time when her family will all be together again. This no doubt means having them all try to get a start on the home farm or on some adjacent place. She gets $20 a month from each of the five boys, which she mostly invests in war bonds. Although the boys told her to use the cash for fixing up the farm house and getting conveniences they long desired, she prefers to put it away in a snug place and have it ready to give some of the boys for future farming operations. Only two of her sons had been injured in battle up to last reports. She trusts that the rest will come through healthy and strong so they can bend their energy to the plow handles.

Here we have a family that managed to clear only 40 acres of land in more than 20 years, partly due to depression prices, partly to poor yields. The background of experience and manual skill and progress these lads have had at home is not stimulating in many ways toward future success in agriculture. Most of them took winter jobs in the logging and pulpwood industry before the war, and three of them have a high school education. What would a jury recommend for these returning soldiers? Put them all back in agriculture or encourage them to divide their interests?

IT'S true that the zones from whence these cases come are not the best developed farming sections of my state. This may have a bearing on the issue, but even in the well-settled, century-old agricultural regions the cards will be stacked just as bad owing to the fact that the older areas usually have

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J. D. Warner in a field of blue lupine at the North Florida Agricultural Experiment Station, Quincy, Florida. Photographed Feb. 23, 1944.

# Blue Lupine Is A Valuable Legume

*By R. Y. Bailey*

Chief, Regional Agronomy Division, Soil Conservation Service, Spartanburg, S. C.

FROM a 2-pound packet in the fall of 1935 to more than 4 million pounds of seed harvested in the spring of 1943 is the remarkable record of blue lupine. This bushy annual promises to be the answer to the search for a winter legume that will produce good crops of seed in the lower South.

Although lupines have been grown in several of the European countries since ancient time, they have only recently come into prominence in the South. Roland McKee of the Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, sent the 2-pound packet of seed to the North Florida Agricultural Experiment Station at Quincy.

In commenting on the blue lupine planting at Quincy Mr. McKee said: "The testing of lupines that led up to this planting began in connection with our cooperative work with the Florida and Georgia Experiment Stations in 1930 when plantings were made at Gainesville, Florida, and Tifton, Georgia. In 1931 plantings were also made in connection with cooperative work with North Carolina and South Carolina Experiment Stations.

"These tests, together with plantings in subsequent years, indicated the possibilities of lupines in the South and made it clear that special inoculation is required in getting lupines started. The seed sent to Quincy in 1935 was a part of this general program. Special work was also started in 1935 in Louisiana in cooperation with the Louisiana Experiment Station, with very promising

results as indicated by the Louisiana State Experiment Station Annual Report for 1941-1942, issued June 30, 1943."

Various lupines had been tested at several of the other Southern experiment stations at intervals over a period of 30 or more years. Most of this earlier work was at stations considerably north of Quincy, Florida, and, because of less favorable climatic conditions, results were so disappointing that most agronomists had about written the lupines off as cover crops for the South.

Fortunately, the soil and climatic conditions at Quincy were favorable for blue lupine and it made vigorous early-season growth and produced such heavy yields of seed that it attracted the attention of all who saw it.

It also was fortunate that J. D. Warner was agronomist at the Quincy Station when the lupine seed was sent there. He recognized the possibilities of this legume as a cover crop for the lower South. Warner has done outstanding work as a plant breeder and as a tester of newly introduced grasses and legumes. Notable among his accomplishments as a plant breeder was the development of rust-resistant oats adapted to conditions in the deep South. His work with pastures and grazing crops also has been outstanding.

Seed produced from the planting made at Quincy in the fall of 1935 was harvested in the spring of 1936 and planted for increase that fall. In the fall of 1938, small quantities were released for trial plantings on farms. A small quantity of seed was sold to the Soil Conservation Service for the demonstration area at Greenville, Alabama. Again in the fall of 1939, Warner let the Soil Conservation Service have a few hundred pounds for trial plantings at the land utilization project, Munson, Florida, and in CCC camp work areas in southern Georgia, Alabama, and Mississippi. Plantings in Florida, Alabama, and Georgia gave promising results, and larger quantities of seed were planted in the fall of 1940. Because of an unusually severe winter in the 1939-40 season, lupine did not succeed in south Mississippi. A few plantings made in the fall of 1942 were more successful, and seed was harvested from small patches in 1943.

Warner also released seed to individual farmers, county agents, teachers of vocational agriculture, and other agri-

**A general view of a 70-acre field of blue lupine grown for seed production in Huston County, Alabama. The acre rate of seeding was 50 lbs. Photographed April 16, 1942.**

**Blue lupine at Blakely, Georgia, was sown immediately after runner peanuts were harvested, September 4, 1943, and covered with a section harrow. The field was heavily gleaned by hogs. Photographed Feb. 24, 1944.**

cultural workers. From the seed produced at the Quincy Station and distributed for trial plantings, blue lupine rapidly developed into a winter green-manure crop of importance. Farmers in Florida, Georgia, and Alabama harvested between 4 and 5 million pounds of seed in the spring of 1943. This seed had a cash value of more than $325,000.

In addition to its excellent seeding habits, blue lupine grows off more rapidly and is ready to turn under earlier than other winter legumes. When planted by the middle of October, lupine usually makes sufficient growth to turn under so that the crop that follows it can be planted by the middle of March. Green-weight yields of above 10,000 pounds per acre by the middle of February are not unusual. Elijah Cook, a north Florida farmer whose address is Falco, Alabama, had 19,000 pounds of green lupine per acre on February 2, 1943, from a planting made September 1, 1942.

Blue lupine has grown well on most of the soils found in northern Florida and southern Alabama and Georgia. It also has grown well on the light sandy soils in the citrus-producing section of Florida. When seeded just before irrigation water was applied in citrus groves in the fall, lupine has made excellent early growth and promises to be a valuable orchard cover crop in irrigated orange groves. Like most other legumes, lupine has grown most satisfactorily on well-drained, fertile soils. In some instances, it has appeared that damping-off of the young plants was more severe on light sandy land than on heavier soils.

Cold damage was more severe in December 1943 on flat than on sloping land. Air drainage probably was a factor in freeze injury on the fields that were low and practically level.

Experience to date indicates that best results may be expected with blue lupine when it is planted early, September 1 to October 15. A few August plantings have been seen where plants survived the high temperatures of late August and early September, but, so far, these earlier plantings have not given as good results as those made from September 15 to October 15. Plants from seedings made in September have sometimes been so far advanced in growth that they were severely damaged by freezes

in January or February. Where this has occurred, however, the plants usually have made sufficient growth for a satisfactory green-manure crop. September plantings usually get sufficient rain to bring the plants up before the dry weather that often occurs in October and November.

Farmers sometimes plant blue lupine as late as the first to the middle of December and make moderately good crops of seed. Most of them prefer earlier planting, particularly when the crop is to be turned under as green manure. The young plants from late seedings often are severely damaged by cold, grow off late in the spring, and make smaller yields of seed than those planted earlier.

Blue lupine plants have shown remarkable ability to withstand extended periods of hot, dry weather in the fall. The small plants wilt during the day and look as if they are dead, but revive at night. Survival of plants during the severe drought in October and November 1943 was considerably better than that of Austrian winter peas under similar conditions.

There is considerable difference of opinion about the rate of seeding blue lupine. When planted early, 50 pounds of seed per acre usually gives a fair stand that covers the ground well late in the spring and makes a large crop of seed. Farmers who grow and harvest their own seed often sow 75 to 100 pounds per acre. The heavier rate gives a thicker stand and earlier ground cover. Also, where drought, disease, or worms reduce stands, a thick seeding is more likely to have enough plants survive for a fair stand than will a thin seeding.

Most farmers and agricultural workers who have had experience with blue lupine agree that shallow covering of the seed is essential in getting stands. Most experienced growers recommend covering seed from ½ to 1½ inches deep. In connection with depth of covering J. D. Warner says, "Lupine certainly should not be covered more than 2 inches deep and ½ inch seems to be plenty." Most of the farmers who have expressed an opinion about covering have emphasized the importance of very shallow covering. On light sandy soils in central Florida, covering of 1½ to 2 inches gave bettter stands in 1943 than shallower covering.

**Left, blue lupine in Dale County, Alabama, sown broadcast Sept. 10, 1943, before runner peanuts were dug; right, lupine drilled Dec. 1, 1944, after peanuts were dug. Green weight on Feb. 24, 1944—left, 6,000 lbs.; right, 3,000 lbs. per acre. The rate of seeding was 50 lbs. per acre and the field was gleaned by hogs after peanuts were dug. Photographed Feb. 25, 1944.**

Blue lupine seed has been planted broadcast and with various kinds of drills. Satisfactory stands have resulted from both methods. J. D. Warner followed his grain drill with a cultipacker in 1943 and is sure that stands were improved by cultipacking.

Like other legumes, lupine requires inoculation when grown for the first time. Most farmers inoculate the seed each year with a special lupine culture, even when planting on land where lupine has grown before. The small acre cost of inoculation is considered by most growers to be cheap insurance. A few farmers have planted lupine on land where it has grown before and omitted the inoculation with satisfactory results.

Maxwell Strom, chairman of the board of supervisors of the Gadsden Soil Conservation District in Gadsden County, Florida, has grown blue lupine since 1938. When asked about inoculation Mr. Strom said, "I had a terrace interval in lupine in 1940 that I left to mature seed. After I gathered the seed, the land was idle the rest of the summer. That fall, for my own information, I sowed lupine on this terrace interval without inoculation. Just above the terrace, where no lupine had been grown previously, I inoculated the seed. If there was any difference in the growth or the number of nodules produced, the lupine that followed lupine and was not inoculated was better than that artificially inoculated, but planted on land where lupine had not grown before.

"I used soil from a field that had previously grown lupine to inoculate seed in 1941. I had just as good luck with it as I did with seed where I used artificial inoculation."

The extent to which the bacteria in commercial inoculant survived several weeks of dry, hot weather when seed was sown in dry soil in the fall of 1943 was a surprise to most who observed it. In several cases, lupine seed sown when peanuts were dug lay in the dry soil 2 to 5 weeks before there was enough rain for germination, but in January 1944 the plants appeared to be fairly well inoculated, except where seed was not well covered.

Fertilizer requirements of blue lupine are, so far as is known, about the same as for vetch and Austrian winter peas. J. D. Warner warns against drilling lupine seed and fertilizer down the same drill spout. He has found that the seed often is injured by direct contact with phosphate. Roots of young seedlings also have been injured by concentration of fertilizer in drill furrows. Warner says, "It is all right to broadcast the seed and phosphate separately and then disk them in together, but there is too much concentration of phosphate on the seed when they are drilled together."

### A Good Seed Producer

Blue lupine usually matures seed by the first to the middle of May. Yields of seed have varied, but this legume has been a consistent seed producer. Yields of 1,000 to 1,500 pounds of seed per acre are quite common. M. L. Pierce, Uriah, Alabama, harvested 28,000 pounds of seed from 20 acres in 1943. Grady Baggett, Baker, Florida, harvested 2,185 pounds of seed from one acre in 1943.

Larger yields of seed usually are made on early than on late plantings. J. D. Warner says, "Yields of lupine seed vary with planting dates and weather conditions. My December plantings average 1,000 pounds of seed while those made the middle of October average 1,300 to 1,400 pounds per acre." Farther north earlier planting is even more important than it is at the Quincy Station.

Most of the lupine seed is harvested with combines. Farmers who grow small patches for seed sometimes harvest by pulling the plants when the seed is ripe and flailing the plants against woven wire stretched over a wagon bed. The seed shatter and fall through the wire into the wagon bed. Lupine seed shatters if not harvested soon after it is ripe. Some years the

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# Leaf Analysis — A Guide to Better Crops

*By M. E. McCollam*

San Jose, California

**The taking of proper samples of leaves in the field is important as the first step in leaf analysis.**

PLANTS grow upon the soil and derive an important part of their nutrition from the mineral elements which are available to them from the soil. We know that all soils contain more or less of the minerals essential as plant foods. We do not always know why a plant grows well, or grows poorly on a soil. There are outside factors such as diseases, insects, and climate, and soil factors such as soil moisture, soil structure, and the level of soil fertility itself, which govern how a plant grows.

In trying to arrive at the causes for crop behavior concerned with soil fertility, it seems quite logical to analyze by chemical means a part of the plant itself to see how much of the essential mineral elements the plant has been able to get from the soil. If we are familiar with the quantities of these elements found in good plants and the quantities found in deficient plants, we can interpret many crop troubles by making such chemical analyses.

In choosing a part of the plant to analyze, the leaf is usually considered best because it is such a vital part of the plant in its nutritional processes. It is in the leaf that the plant foods are gathered and combined for redistribution throughout the plant. The leaf is the breathing and manufacturing organ of the plant.

If the plant cannot get enough of any one of the essential mineral elements from the soil, life processes are crippled and crop production suffers. Leaf analysis and its proper interpretation, therefore, reveal shortages of essential plant food, and are a most direct guide to better fertilizer practices and better crops.

In taking samples of leaves, it is important to take leaves from the same relative location on the plant, so that all samples will be comparable. For instance it has been determined on fruit trees that a leaf from the lower portion of the current year's new growth is most suitable for analysis. In the case of orange trees, which are classed as evergreens, a leaf from the spring cycle of growth is taken. To be more sure of this location on the orange tree, a leaf just behind a small green fruit is selected for sampling. With grapes, a recently matured leaf some distance away from the tip of the new cane is taken. The leaf selected for leaf sampling of sugar beets is midway between the old outer leaves and the small, immature leaves in the center. In other words, it is an active,

recently matured leaf. So with other crops, it is desirable to choose the best leaf location for the sample to be analyzed. In some cases the entire leaf is analyzed, and in other cases only the leaf stem or leaf stalk is kept for analysis.

It is desirable in a thorough study to take several leaf samples during the season, in order to determine how well the plant is being supplied with mineral nutrients during its growth and when shortages begin to appear. However, it has been found that one leaf sample taken at the proper time of year and analyzed may give a good indication of the mineral nutrient status of the crop, and may be used to interpret its present condition and final yield. Such a leaf sample should be taken after the early growth period and well before the harvest period. As an example, leaf samples from fruit trees in California taken in late June or early July have been found to be quite indicative of the nutrient condition in the trees. Should such a leaf sample taken in mid-season show a low value, this is significant in indicating that the plant has too little of the nutrient in question to insure maximum crop production. Should the sample show a high value, it would indicate an amount of the nutrient sufficient to carry through for a good crop yield.

If leaf samples are taken too early in the season, all analytical results for nitrogen, phosphorus, and potash may show high values. If taken too late in the season, all values are apt to be low.

The chemical analysis of plant tissue, whether it be the laboratory analysis of leaves or rapid chemical tests on plant tissue which can be performed in the field, has found widespread usefulness.

It has been successfully used as a means of surveying fertilizer needs of entire districts or individual farms with respect to a wide variety of crops. It is at the same time a guide for the grower to use in arriving at more intelligent fertilizer use and a valuable aid to the research worker in locating field experiments and interpreting the results.

In making leaf surveys of large crop areas, it has been the practice to take the leaf samples extensively at first, then pick out localities within the area which show a number of low analyses for one or more of the plant foods. The next step is more intensive leaf sampling within these certain areas to localize the deficient areas.

Such a survey was recently made in an important grape district in California. In considering the potash content of the leaf samples taken, the results of the first extensive sampling within the district revealed an area giving a number of low potash values. In sampling this area more intensively it was found that 60 per cent of the leaf samples taken were in the low range for potash.

### The Fertilizer Program

Leaf surveys of individual farms, especially where rather large acreages are involved, have proven of great value in interpreting crop behavior and in making more effective use of fertilizers. The procedure here is to map the acreage and the location of each leaf sample taken. The results of the chemical analyses are then filled in on the map with different colors for nitrogen, phosphorus, and potash. A fertilizer program can be adopted on the basis of the leaf survey map. Subsequent leaf surveys are helpful in confirming the effectiveness of the fertilizer and indicating changes which should be made in the fertilizer program.

The successful use of leaf analyses by California Packing Corporation on a large peach orchard in California is described in brief by P. D. Caldis, A. R. Brown, and R. T. Marks of that organization. "The yield of cling peaches depends on the ability of the tree to size a crop, regulated by thinning. To determine the causes of partial inability on a 3,000-acre ranch near Merced, California, leaf analysis was resorted to. Comparative analyses,

**Normal leaves such as this one contain more than 1.5 per cent potassium.**

yearly since 1937, of leaves of peach trees from various blocks of the Merced and neighboring orchards, have revealed the $K_2O$ content of the Merced ranch ranging between 0.87 and 2.73 per cent, while well yielding and sizing orchards in neighboring counties but different soil types analyzed 2.72 and 5.19 per cent. No symptoms of potash deficiency could be observed and in many respects the trees, fertilized adequately with nitrogen, appear normal. Applications of potash and phosphorus either alone or in combinations, yearly, at 900 pounds per acre each, have not shown response, until single applications of 4000 pounds of potassium sulfate per acre were made. Without fur-

**Leaves such as these containing less than 0.5 per cent potassium are starved for potash.**

**Leaf analysis can be used as a guide to prevent trees getting into this condition. The prune trees above are severely damaged by die-back due to potash deficiency.**

ther applications, the $K_2O$ content was increased gradually to 2.53 per cent from 0.87 per cent at the end of the fourth year since application; the mean diameter of the fruit was increased by 2 mm., while the yield of No. 1 fruit was increased by 4.8 tons. A potash survey of the ranch was carried out by means of leaf analysis and the deficient areas treated in 1942."

Experiences with leaf analysis on fruit trees in the Eastern United States have been quite favorable, according to Drs. Cullinan and Batjer of the U. S. Department of Agriculture. They state, "It is believed that the results obtained with leaf analyses justify their further use with fruit trees as an index of the adequacy of available nutrients in the soil and as an aid in diagnosing abnormal growth responses that may be caused by mineral deficiencies."

Leaf analysis is being used extensively by Dr. O. Lilleland and Mr. J. G. Brown of the University of California in studying nutrient disturbances in prune, peach, and almond orchards. In much of this work the results of leaf analysis have correlated with such symptoms as leaf scorch and die-back of the trees, and failure of the fruit of peach trees to reach satisfactory size.

Extensive studies with leaf analysis of grapes, clover, and sugar beets have been made by Dr. A. Ulrich of the University of California. The responses obtained in fertilizer experiments on grapes have correlated with leaf analysis results. He concludes that after reliable critical levels for the mineral nutrients have been established for a crop, leaf analysis can be used to arrive at fertilizer recommendations.

Much valuable information on the fertilizer requirements of Ladino clover has been obtained through leaf analysis, both in field experiments with fertilizers and more extended leaf surveys.

Recently the beet sugar industry has been collecting leaf samples from many sugar beet fields during the growing season. The Plant Nutrition Laboratory at the University of California is analyzing these leaf samples. Through such a cooperative effort much information on the nutrient status of sugar beets in California will be gained and will lead to more effective fertilizer use.

Leaf analysis has been applied to the tomato crop in California in surveying

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# Stumbling Blocks to Responses From Plow-Down Fertilizers

*By D. F. Beard*

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WHERE nutrients are the principal limiting factors in crop production, heavy applications of complete fertilizers plowed under have given substantial yield increases. Under such conditions in the Corn Belt, no other method of applying 500 to 1,000 pounds of 8-8-8 or similar grade per acre has proved as satisfactory under a variety of conditions for corn and some other row crops. Since most improved farm practices are accepted first by the more enterprising farmers on the better land, the natural question is "What results can be expected on more productive land?" Speculation also arises as to whether nitrogen plowed under coupled with higher rates of phosphorus and potash in the planter row would produce the same results as 8-8-8 fertilizer put under, or, would phosphorus and potash plowed under at heavy rates meet the needs on fertile land without additional nitrogen?

Eight farm comparisons were set up in Ohio in 1943 on lands ranging in productivity from very poor to very good. Unfortunately, excess water early in the season and extreme variation in stands of plants between treatments eliminated four of the eight. The remaining four were on better-than-average land and were harvested, although hail damaged one of these.

Combinations of fertilizer nutrients were used rather than grades as listed.

**Left: AxTr over 10-10-0 treatment; right: Ohio W36 across same treatment. Broken plants in AxTr were 66.7 per cent of total compared with 4.7 per cent for Ohio W36. Although stalk breakage was greater with 10-10-0 than with 10-10-10, in the case of most hybrids, the behavior of individual hybrids varied in this regard. See Table 4.**

TABLE 1.

Acre yields in bushels of shelled corn at 15½% $H_2O$ content are given in body of table.
Per cent broken stalks in parentheses ( ).
Previous crop: Corn-stalks left on ground.
Manure applied: 10–12 loads of strawy shed manure just prior to plowing.
Row fertilizer: 200 pounds of 2–12–6 per acre.
Date planted: May 6, 1943. This was early for the area. Corn-borer infestation was heavy and damage severe on Iowa 939 and U. S. 13 under NP treatment. Average stand of plants 10,500 per acre. (Weight of ears per plant .44 pound.)

| Hybrid | Plow-down treatment | | | | | |
|---|---|---|---|---|---|---|
| | 800 lbs. 10–10–0 | 800 lbs. 0–10–10 | 800 lbs. 10–10–10 | 800 lbs. 10–10–20 | Nothing plowed down | Average |
| U. S. 13 | 63.0 (7.5) | 64.0 (11.4) | 78.9 (6.5) | 83.4 (9.0) | 60.1 (7.0) | 69.9 (8.3) |
| Iowa 939 | 54.3 (17.0) | 58.8 (7.8) | 72.5 (12.6) | 60.0 (11.0) | 48.7 (7.9) | 58.9 (11.3) |
| Ind. 608C | 62.9 (5.6) | 47.3 (4.5) | 71.3 (1.9) | 78.5 (3.5) | 41.2 (5.9) | 60.2 (4.3) |
| Ohio W36 | 76.0 (10.6) | 69.0 (6.4) | 84.4 (1.9) | 76.1 (1.0) | 58.3 (2.0) | 72.8 (4.4) |
| Average | 64.1 (10.2) | 59.8 (7.5) | 76.8 (5.7) | 74.5 (6.1) | 52.1 (5.7) | |
| Gain in yield | 12.0 | 7.7 | 24.7 | 22.4 | | |

However, uniform rates per acre in terms of the grades shown are given for ease of comparison.

800 lbs. of 10-10- 0 plowed under
800 lbs. of 0-10-10 plowed under
800 lbs. of 10-10-10 plowed under
800 lbs. of 10-10-20 plowed under

Across these parallel treatments four corn hybrids were planted. Two of the hybrids were as early as any recommended for the area—Iowa 939 and Ohio W36; one was intermediate in maturity—Indiana 608C or AxTr; the other was U. S. 13 which is the latest recommended in the areas where the comparisons were made.

All of the fertilizer plowed under was applied with a grain drill before plowing. Placement on the furrow bottom in bands was desired but impossible because of lack of equipment. The regular fertilizer application to which the farmers were accustomed was made in the row or hill when the corn was planted.

On a field of Fincastle silt loam in Preble County the earliest planting was made. The corn was planted May 6 by which time less than 25 per cent of the corn in the area had been planted. Results given in Table 1 indicate clearly the inferiority of the treatments not containing all three of the elements nitrogen, phosphorus, and potash.

Corn-borer damage was greater in these early planted comparisons than in those planted late in May or June. Yields were reduced at least 10 to 15 bushels to the acre because of borer injury. Greatest damage occurred on the treated strip which received no potash. Stalk breakage also averaged most on the 10-10-0 strip. Just prior to tasseling, corn on all nitrogen-treated strips stood 18 to 20 inches taller than

where the heavy nitrogen application was omitted. Yield responses were less, therefore, due to corn-borer damage than could have been expected in the absence of borer under similar conditions. Placing the nitrogen on the furrow bottom does not stimulate early growth to the extent observed here—a possible advantage to be noted where corn borer is present. No advantage for double potash (10-10-20) over 10-10-10 was observed in these comparisons either in leaf blight control or yield. The need for a balance between nitrogen and potash (compare the 10-10-0 and 0-10-10 strips with the 10-10-10) at these rates of application is probably the most significant observation to be made, especially in view of the fact that the cornstalks from the previous crop were left on the field and a manure application of 10-12 loads per acre accompanied the various fertilizer treatments.

A similar set of comparisons was duplicated on a Miami silty clay loam in the same county. Here a mixed legume grass sod, rather than corn, preceded the corn crop. Planting was done June 4, nearly a month later than on the first farm, and corn-borer damage proved negligible. Gains for all plow-down treatments were small but probably significant. Since these gains were essentially the same for all treatments, phosphorus (being common to all) was undoubtedly responsible for them. See Table 2.

The most interesting observation to be made from these comparisons is the high ear weight, or production per plant of .70 pound of dry ear corn. In a 21-year experiment at the Ohio Agricultural Experiment Station, highest corn yields were obtained with a stand of plants averaging 14,220 per acre and an average ear weight of .46 pound. In the same experiment, and in the better seasons, an ear weight of .71 pound was obtained and a yield of 63.3 bushels with 7,110 plants per acre compared with .51 pound ears and a yield of 89.9 bushels with 17,775 plants per acre. Each .01 pound in ear size above the optimum .51 pound cost one bushel per acre in grain yield in this experiment.

Obviously, the .70 pound "show" ears produced in the comparisons reported in Table 2 were made at a severe yield loss. Fertility was not seriously limiting, but too few plants per acre were.

TABLE 2.

Acre yields in bushels of shelled corn at 15½ per cent $H_2O$ content are given in body of table.

Previous crop: Alfalfa-clover-timothy.

Manure applied: 10 loads per acre.

Row fertilizer: 100 pounds of 0–20–0 per acre.

Date planted: June 4, 1943. Average stand 8,620 plants per acre, or about ⅔ that desired. Being drilled in 40″ rows this gave only one plant every 18″. Very few broken stalks were found, and so relative amounts were not determined. (Weight of ears per plant .70 pound.)

| Hybrid | Plow-down treatment | | | | |
|---|---|---|---|---|---|
| | 800 lbs. 10–10–0 | 800 lbs. 0–10–10 | 800 lbs. 10–10–10 | 800 lbs. 10–10–20 | Nothing plowed down |
| U. S. 13 | 97.2 | 85.2 | 91.0 | 94.8 | 87.7 |
| Ohio W36 | 85.8 | 87.6 | 89.3 | 86.6 | 76.6 |
| Ind. 608C | 83.0 | 87.1 | 84.2 | 82.9 | 76.3 |
| Iowa 939 | 83.5 | 85.1 | 81.0 | 93.8 | 81.6 |
| Average | 87.4 | 86.3 | 86.4 | 89.5 | 80.6 |
| Gain in yield | 6.8 | 5.7 | 5.8 | 8.9 | |

TABLE 3.

Acre yields in bushels of shelled corn at 15½ per cent $H_2O$ content are given in the body of the table, the per cent broken stalks in ( ).

Previous crop: Clover-timothy.

Manure applied: 12 loads of stable manure per acre.

Row fertilizer: 240 pounds of 3–18–9 per acre.

Date planted: June 4, 1943. Average stand 9,300 plants per acre, or about ¾ that desired. This gave only one plant every 17″ in 40″ rows. Hail severely damaged the crop at earing time and no doubt reduced yields considerably. (Weight of ears per plant .54 pounds.)

| Hybrid | Plow-down treatment | | | | |
|---|---|---|---|---|---|
| | 800 lbs. 10–10–0 | 800 lbs. 0–10–10 | 800 lbs. 10–10–10 | 800 lbs. 10–10–20 | Nothing plowed down |
| U. S. 13 | 85.7 | 81.4 | 79.8 | 75.5 | 77.6 |
| Ohio W36 | 74.7 | 67.6 | 72.1 | 74.1 | 61.6 |
| Ind. 608C | 68.3 | 70.6 | 67.3 | 65.9 | 61.7 |
| Iowa 939 | 69.8 | 74.1 | 73.5 | 77.5 | 66.5 |
| Average | 74.6 | 73.2 | 73.1 | 73.3 | 66.6 |
| Gain in yield | 8.0 | 6.6 | 6.5 | 6.7 | |

Results on Miami silt loam on another farm, Table 3, followed a similar pattern. In spite of hail damage, yields were good and ear weights were above optimum for highest acre yields.

Planting rates were stepped up on a fertile river bottom field in Fairfield County and yields of the better hybrids exceeded 100 bushels per acre. Even here, however, it is questionable that a sufficient number of plants per acre occupied that land. While the average weight of ears per plant was .51 pound for this entire area, it averaged .63 and .56 pound, respectively, for the two highest yielding hybrids. It should be

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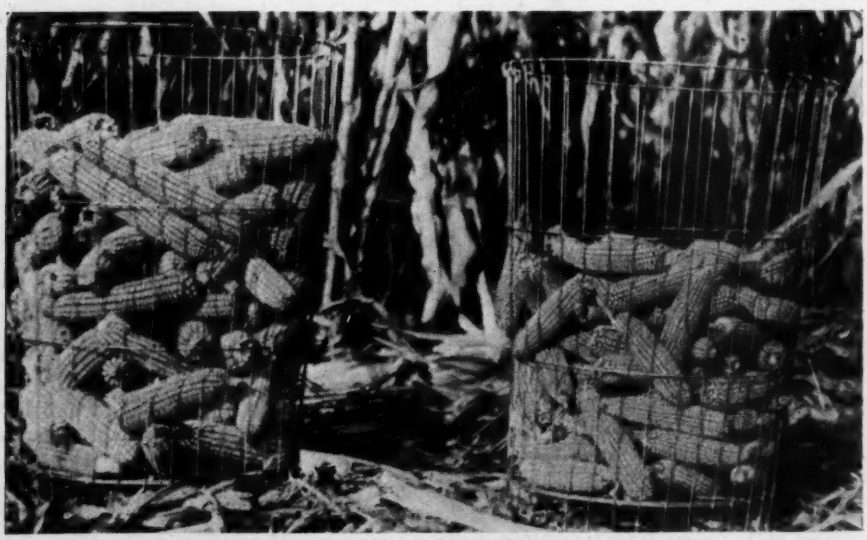

**Comparative yields obtained with four hybrids in Preble County comparisons showing gain for 800 lbs. per acre of 10-10-10 plowed under. Left: Yield of 76.80 bushels from 10-10-10 treatment; right: Yield of 52.1 bushels with row fertilizer only. See Table 1.**

# Lime Is the Key to Potash Efficiency

*By S. S. Obenshain and P. T. Gish*

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THE oft-repeated saying of Professor T. B. Hutcheson of the Virginia Agricultural Experiment Station that "the only thing a farmer has to sell is plant food" leads to the conclusion that the most efficient user of plant food should be the most successful farmer. While passing through the early years of the war food production program when there was so much discussion about a scarcity of potash, the natural thing to do was to search for more efficient ways of using potash. A study of experimental data in Virginia indicates that in practically every case, consistently greater yields from the use of potash alone and in combination with nitrogen and phosphoric acid have been obtained when the soil was adequately limed. The most striking of such data are taken from an experiment carried on at Staunton, Virginia, on a soil mapped as Berks silt loam. Soils of this and closely related series are among the most extensive soils in the limestone valley of Virginia and extend through West Virginia and Maryland into Pennsylvania. Similar results can be expected on many of the other soils of the Southeast, but the degree of response will vary.

The experiment described herein was carried on in a three-year rotation of corn, wheat, and red clover, each crop being grown every year in adjacent series of plots. The results are given in Table I. Each of the plots on which various combinations of nitrogen, phosphoric acid, and potash were used was divided into two sub-plots, one of which

TABLE 1—THE EFFECT OF NITROGEN, PHOSPHORIC ACID, AND POTASH WITH AND WITHOUT LIME ON THE YIELD OF CORN, WHEAT, AND RED CLOVER ON BERKS SILT LOAM. 1935-1940.

| Fertilizer Treatment [1] | Corn average yield bushel per acre | | Wheat average yield bushel per acre | | Clover average yield pounds per acre | |
|---|---|---|---|---|---|---|
| | Unlimed | Limed | Unlimed | Limed | Unlimed | Limed |
| O | 11.57 | 21.14 | 5.67 | 13.14 | 604 | 1,379 |
| P | 20.63 | 27.44 | 13.73 | 21.64 | 1,050 | 2,279 |
| P–K | 25.64 | 40.79 | 14.03 | 24.21 | 1,187 | 2,569 |
| N–P | 23.60 | 29.19 | 15.38 | 21.72 | 1,210 | 2,408 |
| N–P–K | 30.60 | 47.14 | 16.78 | 24.31 | 1,477 | 2,989 |
| N–P–2K | 36.31 | 48.56 | 19.24 | 25.80 | 1,822 | 3,263 |
| N–P–3K | 38.40 | 48.81 | 20.26 | 27.16 | 1,750 | 3,348 |
| N–2P–K | 36.44 | 46.45 | 20.28 | 27.82 | 1,777 | 3,218 |
| N–2P–2K | 37.62 | 50.44 | 21.55 | 27.76 | 1,783 | 3,365 |
| N–K | 17.46 | 37.65 | 8.96 | 16.65 | 1,035 | 2,382 |
| 2N–2K | 21.16 | 43.45 | 9.22 | 20.81 | 1,198 | 2,702 |

[1] O–No treatment; N–20 lbs. of nitrogen per acre annually; P–32 lbs. $P_2O_5$ per acre annually; K–20 lbs. $K_2O$ per acre annually.

**The corn on the right received potash in addition to the lime, nitrogen, and phosphoric acid used on both plots. Note lodged stalks, left, in contrast to erect ones, right. For the six years, left yielded 29.19 bushels per acre per year; right, 47.14. At $1.00 per bushel, this means approximately $18.00 for the grain alone, resulting from less than $1.00 worth of potash. With present corn prices and the feed available in the fodder, this difference would be far more striking.**

received lime while the other remained unlimed. Yields were therefore taken on each sub-plot. The rate of liming was two tons of ground limestone every six years of the experiment, but the limed sub-plots had received two tons of lime every three years previous to the experiment. The pH of the limed sub-plots varied from 6.5 to 7.8, while that of the unlimed varied from 4.4 to 5.8. The nitrogen was applied as urea, the phosphoric acid as 16 per cent superphosphate, and the potash as muriate of potash.

Since the farmer is more interested in the economy of the use of fertilizer and lime than in the actual increase in bushels and tons, calculations were made to determine the increased values of the crops produced when lime and various fertilizer materials were used. These calculations are based on prices assumed to be about average for the period of the experiment, prices decidedly different from those at present. A similar interpretation can be worked out for any specific price relationship by changing the values for both the crops harvested and the fertilizer used. As the prices for crops increase in relation to the prices of fertilizer and lime, the value of crop over cost of treatment will increase, and the reverse is also true. At present price levels, the returns would be much more favorable than is indicated by these interpretations, since the farm prices of the crops grown are practically double those used in these calculations, while the cost of the fertilizer and lime has advanced less than 25 per cent.

The values used for the financial interpretation were as follows: corn $0.75 per bushel, wheat $1.00 per bushel, clover hay $15.00 per ton, nitrogen $1.50 per unit, phosphoric acid $1.00 per unit, potash $0.80 per unit, and lime $3.00 per ton of ground limestone. This evaluation does not take into consideration the added production of straw or corn stover, nor does it consider the increased value of the crops produced with added fertilizer and lime. There the difference would be more striking than indicated in the discussion. This is particularly true with hay, since the plots receiving lime gave good quality clover hay in comparison

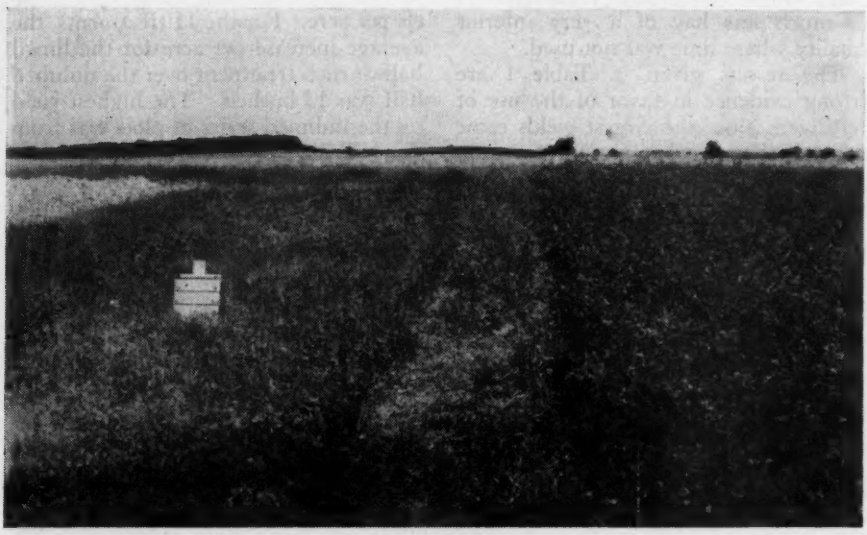
to much less hay of a very inferior quality where lime was not used.

The results given in Table 1 are strong evidence in favor of the use of fertilizers, since the largest yields came from the heaviest application of a complete fertilizer; but even stronger is the evidence that for greater yields and for greater profits these fertilizers cannot be used without lime.

In the case of the corn yields, the phosphoric acid alone gave an increase of approximately 9 bushels per acre. Potash in addition to phosphoric acid gave an increase of approximately 5 bushels on the unlimed plots, and 13 bushels where lime also was used. The nitrogen used in addition to the phosphoric acid was not as effective as the potash in increasing the yield of corn, but the greatest yields were obtained from the use of a complete fertilizer. This increase was also sufficient to give a good profit after paying the added cost of the fertilizer. The addition of potash to the nitrogen and phosphoric acid on the unlimed plots gave an increase of approximately 7 bushels of corn per acre. Where lime was used, the increase was approximately 18 bushels per acre. For the 11 treatments, the average increase per acre for the limed half of each treatment over the unlimed half was 13 bushels. The highest yield on the unlimed series of plots was from the N-P-3K treatment, which also gave the greatest value of crop over cost of treatment. However, by the addition of about $1.00 worth of lime, the value of the crop was increased by approximately $7.75.

In the case of wheat, phosphoric acid increased the yield over check by approximately 8 bushels. The addition of potash increased the yield over the phosphoric acid by only .3 of a bushel per acre. However, the addition of lime to the P-K treatment gave an increase of over 10 bushels of wheat. As with corn, the greatest yields of wheat both on the limed and unlimed half came from a complete fertilizer. On the unlimed half of the plots, this difference was more than enough to pay for the extra cost of fertilizer. On the limed half, only the N-2P-K treatment gave an increase over the P-K treatment large enough to pay for the extra cost of fertilizer based on the average values given below. For the 11 treatments,

**The wheat, right, received phosphoric acid in addition to the lime, nitrogen, and potash used on both. Yield, left, for the six years was 16.65 bushels per acre per year; right, 24.31. At $1.50 per bushel, this means approximately $12.00 in return for about $2.00 worth of phosphoric acid.**



**The clover, right, received lime in addition to nitrogen, phosphoric acid, and potash used on both. For the six years, it averaged 2,989 lbs. of excellent clover hay annually, in contrast to 1,477 lbs. of poor quality hay, left. At $20.00 per ton, this means approximately $15.00 in return for $1.00 worth of lime.**

the limed half yielded approximately 7¾ bushels per acre more than the unlimed half. At present prices, this would give well over 1,000 per cent on investment.

The clover hay on the unlimed half of the plot gave the greatest yield from the N-P-2K treatment and from the N-2P-2K on the limed half. Based on the figures given above, the N-P-2K gave the greatest return over cost of treatment, with the limed half giving approximately $10.00 worth of hay for $1.00 investment in lime. The 11 treatments gave an average yield of 1,354 pounds of hay per acre on the unlimed half; the limed half gave 2,718 pounds, or just over twice as much. It is also interesting to note that for each treatment the limed half gave a yield approximately twice that of the unlimed half. The above interpretation of results does not give due credit to the use of fertilizer and lime at present for two reasons. First, the price of hay is approximately double that used for the above calculations and also due to the fact that the quality of the hay is much better on the fertilized and limed plots. (See Fig. 2.)

The only treatment which did not give sufficient increase in yield to pay for the cost of fertilizer, based on the above values, was 2N.2K where used on wheat and hay. However, the use of lime in addition to the 2N.2K gave approximately $10.00 increase in value above the cost of the lime. The complete fertilizer gave best returns in yields, and also in value over cost of fertilizer in practically all cases. Next to the complete fertilizer came the P-K treatment.

The yields also showed that nitrogen in the fertilizer was relatively more effective in increasing yields on the unlimed plots than on the limed plots. This would be expected, since the clover which grew much more luxuriantly on the limed plots was effective in supplying a portion of the nitrogen needs of the corn and wheat. It is also equally evident that the increase in yield caused by potash in addition to the nitrogen and phosphorus was far greater where lime was used.

With apologies to Kipling, there are several "ifs" to the maximum returns from the use of lime. In the first place,

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**It's in the farmer's hands—this business of soil management. The productivity and physical condition of his soil depend on the crops grown, the cultivation practiced, and the fertility and organic matter returned to the land.**

# Fitting Practices To Soil Conditions

*By Harry H. Gardner*

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ONCE again the soil is being subjected to an outpouring of words relative to its care and management. This deluge is more than a seasonal controversy; it has to do with "washing out" an age-old practice—plowing. It would be folly to attempt to stop the verbal flood, but a review of certain facts should help guide the run-off into proper channels.

From the facts obtained by experimentation and experience, some soil management recommendations have stood the test of time. But, based on the lack of information or the prevalence of misinformation, others have been merely passing fads.

American agriculture has established three cardinal points about soils: (1) They differ; (2) they must be managed differently to maintain high productivity; and (3) they require different measures and practices to control erosion.

Soils vary because of the parent material from which they were formed, the vegetation under which they developed, and the climate (temperatures and the amount and intensity of rainfall) under which they matured.

These factors account for the great soil regions and the specialized crop areas such as the Corn Belt, the Cotton Belt, and the three major wheat areas—soft red winter, hard red spring, and soft white winter. They account for the different tillage methods and crop rotations in general use.

In the Upper Mississippi Valley where the rainfall is above 30 inches a year, where grass-legume meadows are used in the rotation, where crop

yields and plant-food requirements are high, and where the conditions for biological activities are favorable only a relatively small part of the year, plowing is necessary.

In the Corn Belt with its high rainfall, efforts are directed toward high-acre yields of corn. For a time after the virgin sod was broken, it seemed that corn could be grown year after year with satisfactory results. But after a few years of continuous corn, yields began to drop (in spite of improved varieties and strains) and the soil became sticky and harder to plow. The enormous reserve of organic matter accumulated through the ages by the decomposition of native grasses was being exhausted rapidly.

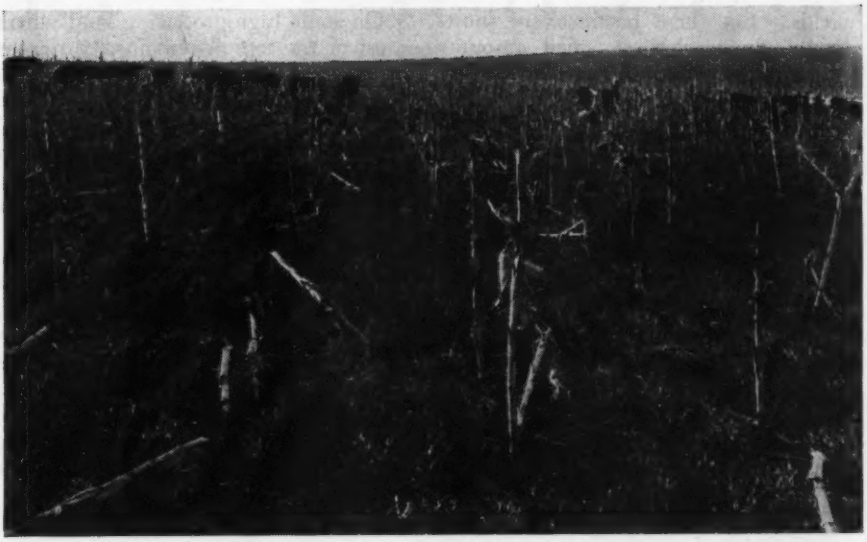
Where rotations including small grain and meadow were used, corn yields were higher and the soil was in better physical condition.

Further investigations have shown that there are many differences in soils in the Corn Belt. Some soils need only one year of meadow in the rotation to maintain a high yield of corn and proper soil tilth, while other soils need two, three, or even four years of meadow. Organic matter from the tons of roots per acre that penetrate the soil to depths of 2, 4, 6, 10 feet, and deeper, and from the crop residues (cornstalks, straw, and animal manure) make the difference. But, it also was discovered that too much organic matter or poorly activated organic matter may be even worse than the lack of organic matter.

Grass-legume meadows were found to be better than either grass or legume alone. Micoorganisms which decompose the raw organic matter need nitrogen to build their bodies and carbon for energy. A mixture of the quickly decomposable residues high in nitrogen and the more slowly decomposable grass roots and highly carbonaceous residues provides this source of food and energy and gives best results. But, bacteria can't live on carbon and nitrogen alone.

Experimentation has proved that decomposition of organic matter is stimulated and plant nutrients released quickly where grass-legume meadows are killed by plowing, the inverted sod tilled to prepare a firm seedbed, and the soil cultivated to keep it thoroughly aerated. Given optimum air, moisture, and temperature condi-

**To plow or not to plow is a question to be answered on the basis of conditions of soil, climate, and vegetation. In the humid Corn Belt, plowing under a meadow crop promotes decomposition of organic matter and kills the plants that otherwise would interfere with a cultivated crop.**



**Grain can be drilled in standing corn in the fall without any other seedbed preparation. If sown broadcast in the spring, disking will cover the seed and chop the cornstalks to provide a good mulch.**

tions, the microorganisms in the soil decompose raw organic matter, freeing nitrates, carbon dioxide, and other nutrients.

Carbon dioxide is given off as decomposition of the organic matter progresses, but nitrates are liberated only after the peak decomposition has passed. While decomposition is in progress, the micoorganisms in the soil and the crop growing on the soil compete for available nitrates. This situation makes it desirable to have the decomposition of organic matter in the soil take place rapidly while the plants are small and before the nitrate requirement of the growing crop is large. Nearly all of the raw organic matter, accumulated during other years of the crop rotation, is decomposed in one year where there is sufficient nitrogen and air for the microorganisms.

As soon as nitrates accumulate in the soil as a by-product of decomposition, they should be utilized by a growing crop. The best crop to capitalize on such a situation is corn. It is planted in May after decomposition has started. The soil is aerated by cultivation. The nitrogen needs of the crop are small, until midsummer after decomposition is at its height. The total requirement for the crop is large.

This program—the accumulation of organic matter by a grass-legume crop, activating it by plowing it under where air, temperature, and moisture conditions are optimum for decomposition, and quickly removing the available plant food with a high value per acre crop—has stood the test for some time.

As long as the potential supply of calcium, phosphate, potash, magnesium, and other minerals remained high, this program left nothing to be desired. But high crop yields gradually reduced the mineral supply until it appeared that organic matter was losing its power to produce. Soil scientists, by prying into the soil's mineral condition with chemical tests, discovered that the supply of available plant foods was becoming exhausted. Supplying active organic matter without maintaining the essential minerals, is exploitative farming.

At first the solution to this problem seemed simple—lime for legumes, a little fertilizer in the hill or row for corn, and under certain conditions a more substantial application with the grain and meadow seeding increased

yields. But these results were short-lived. Such relatively small amounts of fertilizer placed so near the surface of the soil were only a starter. This practice actually reduced the potential supply of available plant foods faster than when no fertilizer was used at all. In field trials larger amounts, placed deeper where more of the roots of crop plants feed, gave better results.

Now, experimental data in some places where moisture is adequate indicate that fertilizer can be applied successfully with attachments for the moldboard plow. Applications of from 500 to 7,200 pounds per acre of a fertilizer having a 1-1-1 ratio placed in the bottom of the furrow when meadow sod is turned over are being used for corn.

### Conservation Practices Necessary

The activated organic matter and mineral replacement program has worked perfectly where erosion has not been excessive. Fortunately, soil and water conservation practices can be used without interfering with the production program. By terracing to reduce the length of slopes, by strip-cropping with alternate meadows to keep water from concentrating, by tilling on the contour to prevent rapid run-off, and by maintaining grassed waterways to carry excess water, soil and water losses are reduced to a minimum and crop yields are increased. Where such conservation practices are not applicable, others may have to be used to control erosion.

In the Corn Belt, sub-surface tillage machines have not given satisfactory results, possibly because the soils are never dry enough when the operations can be performed. The blade cuts through the soggy soil, doing very little or no injury to the roots of weeds and without loosing it sufficiently to promote conditions favorable to the decomposition of organic matter. Where the soil is dry, the blade shatters the soil and does a thorough job of cultivation.

On some high-producing land where most of the topsoil remains, two crops of corn may be grown in succession. When this is done, however, a legume cover and green manure crop should be planted in the first year of corn either during or immediately after the last cultivation. When plowed under the following spring, this crop furnishes the nitrogen needed for rapid decomposition of cornstalks. On most land, crop rotations include only one crop of corn followed by small grain and a seeding of grasses and legumes for meadow. The cornstalks in the field provide winter protection to the soil and hold drifting snow. (Where the corn is cut, a winter cover crop is essential.)

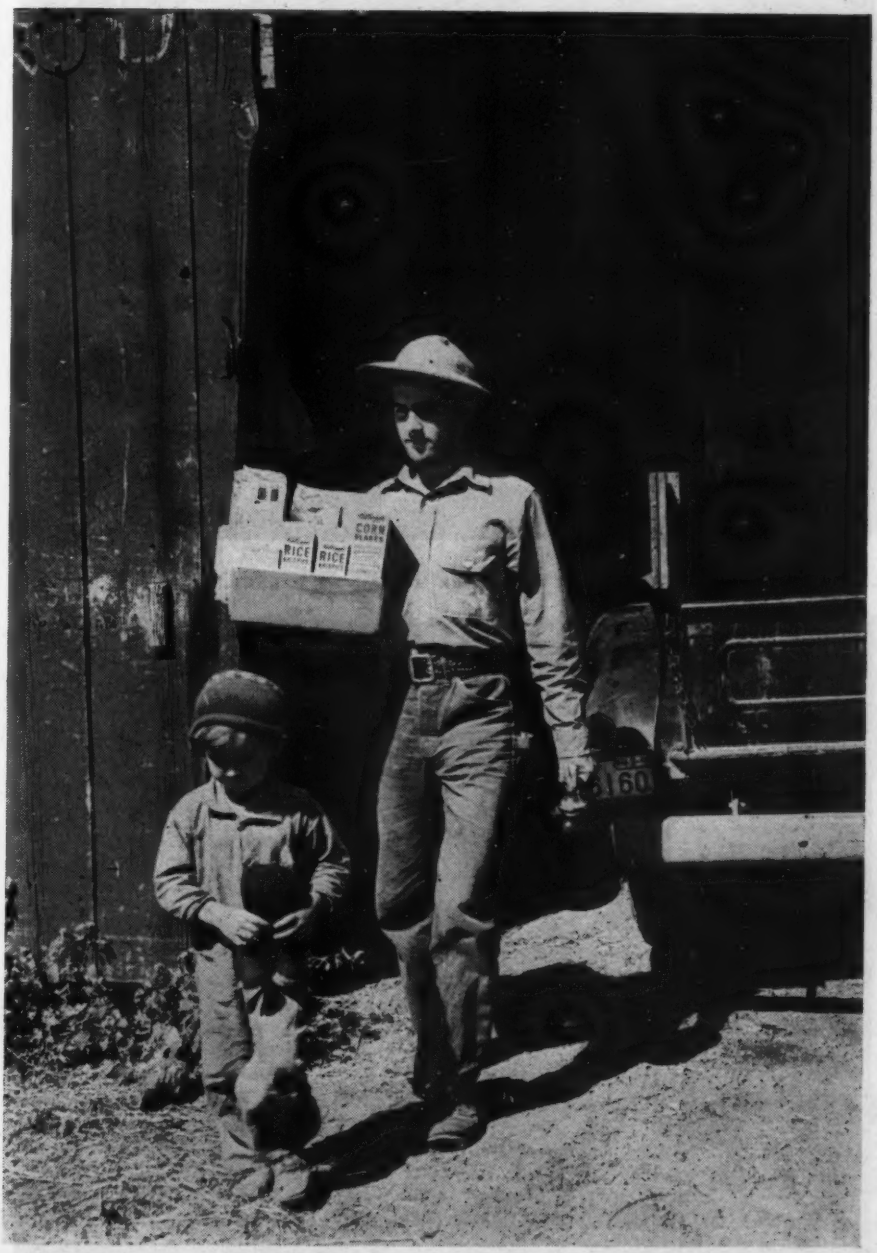
In the Corn Belt, oats usually follow corn in the rotation. They are sown broadcast very early in the spring and the land disked to cover the oats and to chop the cornstalks. Thus all of the raw organic matter is left on or near the surface where decomposition takes place more slowly. The old crop residue left on the surface decomposes, the grasses make a dense network of fibrous roots, especially in the surface soil, and the top roots of the legumes penetrate to great depth, creating a sod condition similar to nature's method of building soil.

When the oat crop is harvested with a combine, the straw is scattered on the new meadow seedings. When harvested with a binder, the straw is used for livestock bedding and returned to the field in the manure before plowing for corn. Following the oat crop no mechanical soil preparation of any kind is done.

Under such a program, high crop yields have been maintained. Corn and oat yields of 100 bushels and hay yields of two, three, or four tons per acre are not uncommon on land that has been farmed from 50 to 100 years. Compare these yields with what nature did under virgin soil conditions or what she is doing now in fence rows or along right-of-ways that have never

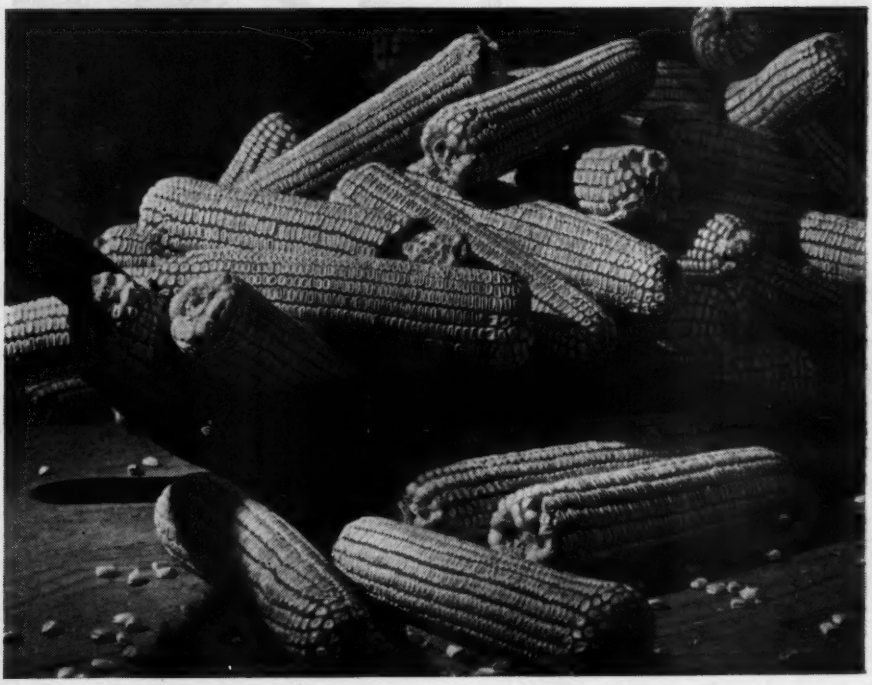
(*Turn to page* 44)

# PICTORIAL




**Back from a Saturday Afternoon in Town.**

THE MAJOR CROPS ARE MOVING TO MARKET.



RIVERS IN DECEMBER—SOUTH AND NORTH.

**Above: Flocks like these help to keep American traditions alive.**
**Below: Staging and seating are impromptu at farm auctions.**

# The Editors Talk

## Charles Bernard Lipman

### 1883 - 1944

Biographical sketches of eminent men chronicle the achievements by which eminence is attained, omitting perforce the traits of mind and soul, the virtues which inspired those achievements. These can be contributed only by friends and admirers. The biographies of Dean Lipman, while establishing his eminence as a scientist and educator, disclose a career of the sort that arouses the admiration of every American, a career beginning when an immigrant boy was brought to this country by his parents from Moscow and ending as Dean of the Graduate Department of one of America's greatest universities, the University of California. Such a career once again epitomizes America as the land of opportunity; but of equal significance in this instance it shows an intellectual and spiritual capacity to make the most of that opportunity; and in delineating a life of public service, it reveals a deep sense of gratitude for that opportunity.

While these biographies make clear an ever-mounting succession of achievements in scientific researches in the agricultural field, and in education, they reveal much that is more accurately indicative of the spirit of Dean Lipman. In addition to being an ardent worker in education and research, his proven interest in the well-being of his fellow man, of high and low estate, and of his community caused him to be sought after for prominent service on such boards and in such associations as the Educational Advisory Board of the John Simon Guggenheim Memorial Foundation, the Belgian American Educational Foundation, the James D. Phelan Fellowships in Literature and Art, the Board of Directors of International House of Berkeley, the Committee of the Sixth Pacific Science Congress, the California Chapter of the American-Scandinavian Foundation, and the State Department Commission on the Adjustment of Foreign Students, not to mention membership in a long list of scientific societies, honorary fraternities, and social clubs.

But still this record fails to reveal one of his outstanding characteristics, the warm-hearted friendship which he unfailingly offered to all those who came within his wide circle of associates. Conspicuous was his charitable attitude toward human frailties, looking for and finding and pointing out the good in everyone, but at the same time intolerant of intellectual dishonesty and of injustice. Against such he stood as an immovable rock, and by that token his own sense of honesty and justice was universally recognized by all who came to know him. It was these rules of life that won for him the host of friends and admirers who now cherish his memory as a precious legacy.

## Hoarding?—No, Common Sense

Is a farmer going home with a truckload of fertilizers these days a hoarder? No, he is just using common sense. Furthermore, he is complying with the Government's suggestion to "Buy Fertilizer Early" and in reality is helping the Nation's war effort.

In normal times, approximately 85 per cent of the fertilizer used during a year is delivered during the first six months of the year, the other 15 per cent going to farms during the last six months. Last year the appeal to purchase early brought sales for the last six months of the year up to 30 per cent. It is hoped that this percentage is being materially increased during the last half of this year.

The reasons for early purchase would be obvious if one considered only the labor problems involved. With the greatest demand for fertilizer in the Country's history, expected to exceed next year by a considerable margin the record 1943-44 consumption of approximately 12,000,000 tons, there will be greater demands on the already short labor supply in manufacturing plants, in transportation, and on farms. It is easy to see the advantage in providing this inadequate labor supply with a longer period over which to get the plant food where it will be available for opportune application.

But to be added to the labor situation are three others which assume real importance as factors behind the Government's request to spread the buying period: inadequate equipment in fertilizer manufacturing plants for meeting heavy seasonal demands, lack of storage space, and greatly reduced transportation facilities. The latter is becoming more acute than ever before with trucks and tires wearing out and deliveries becoming increasingly uncertain.

There has been and continues to be on the part of many farmers a reluctance to store fertilizer even though they have the necessary space and during the press of spring work could well afford the avoidance of last-minute rush and worry over fertilizer deliveries. J. C. Lowery, Extension Agronomist, Alabama Polytechnic Institute, recently offered several worth-while suggestions to help overcome this reluctance. He says:

1. Store fertilizer in any dry building with flooring above the ground, but never on the earth itself.
2. Keep broken bags separate from the main pile. Loose fertilizer is likely to absorb too much moisture and damage the good bags.
3. Make separate stacks of mixed fertilizer, superphosphate, ammonium nitrate, and each other type of material. This makes it easier to clean up any spilled fertilizer and keep it separate.
4. Keep sodium nitrate and ammonium nitrate away from hay, feeds, and organic meals to prevent fire. Dispose of empty bags from which sodium nitrate and ammonium nitrate are emptied.
5. Stack bags close together to reduce circulation of air from which fertilizer absorbs moisture.
6. Keep farm animals away from the storage pile. Sodium nitrate and ammonium nitrate may be injurious when eaten by farm animals.
7. If fertilizer cakes hard enough so that ordinary handling does not break it, drop the bag on each edge and both sides from waist-height.

No records on the amount of next year's fertilizer that has moved to farm storage are available at this time. It is estimated that at least 4,500,000 tons, or 1,000,000 more than were handled last year, will have to be delivered by January 1 if needs of 1945 cropping are to be met. Anything which the official agricultural forces can do to encourage farmers to buy and store their fertilizer early will be a definite aid in meeting next year's crop goals.

# Farm Prices of Farm Products*

| | Cotton Cents per lb. | Tobacco Cents per lb. | Potatoes Cents per bu. | Sweet Potatoes Cents per bu. | Corn Cents per bu. | Wheat Cents per bu. | Hay Dollars per ton | Cottonseed Dollars per ton | Truck Crops |
|---|---|---|---|---|---|---|---|---|---|
| 1910–14 Average | 12.4 | 10.4 | 69.6 | 87.6 | 64.8 | 88.0 | 11.94 | 21.59 | .... |
| 1920 | 32.1 | 17.3 | 249.5 | 175.7 | 144.2 | 224.1 | 21.26 | 51.73 | .... |
| 1921 | 12.3 | 19.5 | 103.8 | 118.7 | 58.7 | 119.0 | 12.96 | 22.18 | .... |
| 1922 | 18.9 | 22.8 | 96.7 | 104.8 | 58.5 | 103.2 | 11.68 | 35.04 | .... |
| 1923 | 26.7 | 19.0 | 84.1 | 104.4 | 80.1 | 98.9 | 12.29 | 43.69 | .... |
| 1924 | 27.6 | 19.0 | 87.0 | 137.0 | 91.2 | 110.5 | 13.28 | 38.34 | .... |
| 1925 | 22.1 | 16.8 | 113.9 | 171.6 | 99.9 | 151.0 | 12.54 | 35.07 | .... |
| 1926 | 15.1 | 17.9 | 185.7 | 156.3 | 69.9 | 135.1 | 13.06 | 27.20 | .... |
| 1927 | 15.9 | 20.7 | 132.3 | 114.0 | 78.8 | 120.5 | 12.00 | 28.56 | .... |
| 1928 | 18.6 | 20.0 | 82.9 | 112.3 | 89.1 | 113.4 | 10.63 | 37.70 | .... |
| 1929 | 17.7 | 18.6 | 93.7 | 118.4 | 87.6 | 102.7 | 11.56 | 34.98 | .... |
| 1930 | 12.4 | 12.9 | 124.4 | 115.8 | 78.0 | 80.9 | 11.31 | 26.25 | .... |
| 1931 | 7.6 | 8.2 | 72.7 | 92.9 | 49.8 | 48.8 | 9.76 | 17.04 | .... |
| 1932 | 5.8 | 10.5 | 43.3 | 57.2 | 28.1 | 38.8 | 7.53 | 9.74 | .... |
| 1933 | 8.1 | 12.9 | 66.0 | 59.4 | 36.5 | 58.1 | 6.81 | 12.32 | .... |
| 1934 | 12.0 | 17.1 | 68.0 | 79.1 | 61.3 | 79.8 | 10.67 | 26.12 | .... |
| 1935 | 11.6 | 16.1 | 49.4 | 73.9 | 77.4 | 86.4 | 10.57 | 35.56 | .... |
| 1936 | 11.7 | 17.2 | 99.6 | 85.3 | 76.7 | 96.0 | 8.93 | 31.78 | .... |
| 1937 | 11.1 | 19.9 | 88.3 | 91.8 | 94.8 | 107.1 | 10.36 | 30.24 | .... |
| 1938 | 8.3 | 17.2 | 55.5 | 76.9 | 49.0 | 66.1 | 7.55 | 21.13 | .... |
| 1939 | 8.7 | 13.6 | 68.1 | 75.4 | 47.6 | 63.6 | 6.95 | 22.17 | .... |
| 1940 | 9.6 | 15.1 | 70.7 | 85.2 | 59.0 | 73.9 | 7.62 | 24.31 | .... |
| 1941 | 13.3 | 19.1 | 64.6 | 94.4 | 64.3 | 84.0 | 8.10 | 35.04 | .... |
| 1942 | 18.51 | 28.3 | 110.0 | 108.3 | 79.5 | 101.8 | 10.05 | 44.42 | .... |
| 1943 | | | | | | | | | |
| October | 20.28 | 41.8 | 128.0 | 196.0 | 107.0 | 135.0 | 13.70 | 52.50 | .... |
| November | 19.40 | 44.5 | 133.0 | 177.0 | 105.0 | 137.0 | 14.50 | 52.50 | .... |
| December | 19.85 | 42.4 | 135.0 | 188.0 | 111.0 | 143.0 | 15.20 | 52.60 | .... |
| 1944 | | | | | | | | | |
| January | 20.15 | 41.5 | 141.0 | 202.0 | 113.0 | 146.0 | 15.70 | 52.80 | .... |
| February | 19.93 | 25.1 | 139.0 | 211.0 | 113.0 | 146.0 | 15.90 | 52.60 | .... |
| March | 19.97 | 21.9 | 137.0 | 220.0 | 114.0 | 146.0 | 16.00 | 52.70 | .... |
| April | 20.24 | 23.8 | 137.0 | 229.0 | 115.0 | 147.0 | 16.20 | 52.50 | .... |
| May | 19.80 | 37.2 | 134.0 | 236.0 | 115.0 | 147.0 | 16.10 | 52.50 | .... |
| June | 20.16 | 49.2 | 125.0 | 233.0 | 115.0 | 143.0 | 15.00 | 52.80 | .... |
| July | 20.32 | 45.0 | 138.0 | 230.0 | 117.0 | 139.0 | 13.90 | 53.00 | .... |
| August | 20.15 | 39.3 | 159.0 | 258.0 | 117.0 | 135.0 | 14.30 | 53.20 | .... |
| September | 21.02 | 42.9 | 147.0 | 219.0 | 116.0 | 135.0 | 14.70 | 52.30 | .... |
| October | 21.25 | 41.2 | 142.0 | 185.0 | 113.0 | 142.0 | 15.20 | 52.70 | .... |
| **Index Numbers (1910-14 = 100)** | | | | | | | | | |
| 1920 | 259 | 166 | 358 | 201 | 223 | 255 | 178 | 240 | .... |
| 1921 | 99 | 187 | 149 | 136 | 91 | 135 | 109 | 103 | .... |
| 1922 | 152 | 219 | 139 | 120 | 90 | 117 | 98 | 162 | .... |
| 1923 | 215 | 183 | 121 | 119 | 124 | 112 | 103 | 202 | .... |
| 1924 | 223 | 183 | 125 | 156 | 141 | 126 | 111 | 177 | 150 |
| 1925 | 178 | 161 | 164 | 196 | 154 | 172 | 105 | 162 | 153 |
| 1926 | 122 | 172 | 267 | 178 | 108 | 154 | 109 | 126 | 143 |
| 1927 | 128 | 199 | 190 | 130 | 122 | 137 | 101 | 132 | 121 |
| 1928 | 150 | 192 | 119 | 128 | 138 | 129 | 89 | 175 | 159 |
| 1929 | 143 | 179 | 135 | 135 | 135 | 117 | 97 | 162 | 149 |
| 1930 | 100 | 124 | 179 | 132 | 120 | 92 | 95 | 122 | 140 |
| 1931 | 61 | 79 | 104 | 106 | 77 | 55 | 82 | 79 | 117 |
| 1932 | 47 | 101 | 62 | 65 | 43 | 44 | 63 | 45 | 102 |
| 1933 | 65 | 124 | 95 | 68 | 56 | 66 | 57 | 57 | 105 |
| 1934 | 97 | 164 | 98 | 90 | 95 | 91 | 89 | 121 | 104 |
| 1935 | 94 | 155 | 71 | 84 | 119 | 98 | 89 | 165 | 126 |
| 1936 | 94 | 165 | 143 | 97 | 118 | 109 | 75 | 147 | 113 |
| 1937 | 90 | 191 | 127 | 105 | 146 | 122 | 87 | 140 | 122 |
| 1938 | 67 | 165 | 80 | 88 | 76 | 75 | 63 | 98 | 101 |
| 1939 | 70 | 131 | 98 | 86 | 73 | 72 | 58 | 103 | 109 |
| 1940 | 78 | 145 | 102 | 97 | 91 | 84 | 64 | 126 | 121 |
| 1941 | 107 | 184 | 93 | 108 | 99 | 95 | 68 | 162 | 145 |
| 1942 | 149 | 272 | 158 | 124 | 123 | 116 | 84 | 206 | 199 |
| 1943 | | | | | | | | | |
| October | 164 | 402 | 184 | 224 | 165 | 153 | 115 | 243 | 264 |
| November | 156 | 428 | 191 | 202 | 162 | 156 | 121 | 243 | 254 |
| December | 160 | 408 | 194 | 215 | 171 | 163 | 127 | 244 | 208 |
| 1944 | | | | | | | | | |
| January | 163 | 399 | 203 | 231 | 174 | 166 | 131 | 245 | 231 |
| February | 161 | 241 | 200 | 241 | 174 | 166 | 133 | 244 | 204 |
| March | 161 | 211 | 197 | 251 | 176 | 166 | 134 | 244 | 191 |
| April | 163 | 229 | 197 | 261 | 177 | 167 | 136 | 243 | 184 |
| May | 160 | 358 | 193 | 269 | 177 | 167 | 135 | 243 | 217 |
| June | 163 | 473 | 180 | 266 | 177 | 163 | 126 | 245 | 245 |
| July | 164 | 433 | 198 | 263 | 181 | 158 | 116 | 245 | 236 |
| August | 163 | 378 | 228 | 295 | 181 | 153 | 120 | 246 | 253 |
| September | 170 | 413 | 211 | 250 | 179 | 153 | 123 | 242 | 239 |
| October | 171 | 396 | 204 | 211 | 174 | 161 | 127 | 244 | 192 |

# Wholesale Prices of Ammoniates

| | Nitrate of soda per unit N bulk | Sulphate of ammonia bulk per unit N | Cottonseed meal S. E. Mills per unit N | Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N | Fish scrap, wet acidulated 6% ammonia, 3% bone phosphate, f.o.b. factory, bulk per unit N | Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N | High grade ground blood, 16–17% ammonia, Chicago, bulk, per unit N |
|---|---|---|---|---|---|---|---|
| 1910–14 | $2.68 | $2.85 | $3.50 | $3.53 | $3.05 | $3.37 | $3.52 |
| 1922 | 3.04 | 2.58 | 6.07 | 4.66 | 3.54 | 4.75 | 4.99 |
| 1923 | 3.02 | 2.90 | 6.19 | 4.83 | 4.25 | 4.59 | 5.16 |
| 1924 | 2.99 | 2.44 | 5.87 | 5.02 | 4.41 | 3.60 | 4.25 |
| 1925 | 3.11 | 2.47 | 5.41 | 5.34 | 4.71 | 3.97 | 4.75 |
| 1926 | 3.06 | 2.41 | 4.40 | 4.95 | 4.15 | 4.36 | 4.90 |
| 1927 | 3.01 | 2.26 | 5.07 | 5.87 | 4.35 | 4.32 | 5.70 |
| 1928 | 2.67 | 2.30 | 7.06 | 6.63 | 5.28 | 4.92 | 6.00 |
| 1929 | 2.57 | 2.04 | 5.64 | 5.00 | 4.69 | 4.61 | 5.72 |
| 1930 | 2.47 | 1.81 | 4.78 | 4.96 | 4.15 | 3.79 | 4.58 |
| 1931 | 2.34 | 1.46 | 3.10 | 3.95 | 3.33 | 2.11 | 2.46 |
| 1932 | 1.87 | 1.04 | 2.18 | 2.18 | 1.82 | 1.21 | 1.36 |
| 1933 | 1.52 | 1.12 | 2.95 | 2.86 | 2.58 | 2.06 | 2.46 |
| 1934 | 1.52 | 1.20 | 4.46 | 3.15 | 2.84 | 2.67 | 3.27 |
| 1935 | 1.47 | 1.15 | 4.59 | 3.10 | 2.65 | 3.06 | 3.65 |
| 1936 | 1.53 | 1.23 | 4.17 | 3.42 | 2.67 | 3.58 | 4.25 |
| 1937 | 1.63 | 1.32 | 4.91 | 4.66 | 3.65 | 4.04 | 4.80 |
| 1938 | 1.69 | 1.38 | 3.69 | 3.76 | 3.17 | 3.15 | 3.53 |
| 1939 | 1.69 | 1.35 | 4.02 | 4.41 | 3.12 | 3.87 | 3.90 |
| 1940 | 1.69 | 1.36 | 4.64 | 4.36 | 3.35 | 3.33 | 3.39 |
| 1941 | 1.69 | 1.41 | 5.50 | 5.32 | 3.27 | 3.76 | 4.43 |
| 1942 | 1.74 | 1.41 | 6.11 | 5.77 | 3.34 | 5.04 | 6.76 |
| 1943 | | | | | | | |
| October | 1.75 | 1.42 | 6.29 | 5.77 | 3.34 | 4.86 | 6.71 |
| November | 1.75 | 1.42 | 6.29 | 5.77 | 3.34 | 4.86 | 6.71 |
| December | 1.75 | 1.42 | 7.39 | 5.77 | 3.34 | 4.86 | 6.71 |
| 1944 | | | | | | | |
| January | 1.75 | 1.42 | 7.40 | 5.77 | 3.34 | 4.86 | 6.71 |
| February | 1.75 | 1.42 | 7.40 | 5.77 | 3.34 | 4.86 | 6.71 |
| March | 1.75 | 1.42 | 7.40 | 5.77 | 3.34 | 4.86 | 6.71 |
| April | 1.75 | 1.42 | 7.50 | 5.77 | 3.34 | 4.86 | 6.71 |
| May | 1.75 | 1.42 | 7.81 | 5.77 | 3.34 | 4.86 | 6.71 |
| June | 1.75 | 1.42 | 7.81 | 5.77 | 3.34 | 4.86 | 6.71 |
| July | 1.75 | 1.42 | 7.81 | 5.77 | 3.34 | 4.86 | 6.71 |
| August | 1.75 | 1.42 | 7.81 | 5.77 | 3.34 | 4.86 | 6.71 |
| September | 1.75 | 1.42 | 7.81 | 5.77 | 3.34 | 4.86 | 6.71 |
| October | 1.75 | 1.42 | 7.81 | 5.77 | 3.34 | 4.86 | 6.71 |
| **Index Numbers (1910-14 = 100)** | | | | | | | |
| 1922 | 113 | 90 | 173 | 132 | 117 | 140 | 142 |
| 1923 | 112 | 102 | 177 | 137 | 140 | 136 | 147 |
| 1924 | 111 | 86 | 168 | 142 | 145 | 107 | 121 |
| 1925 | 115 | 87 | 155 | 151 | 155 | 117 | 135 |
| 1926 | 113 | 84 | 126 | 140 | 136 | 129 | 139 |
| 1927 | 112 | 79 | 145 | 166 | 143 | 128 | 162 |
| 1928 | 100 | 81 | 202 | 188 | 173 | 146 | 170 |
| 1929 | 96 | 72 | 161 | 142 | 154 | 137 | 162 |
| 1930 | 92 | 64 | 137 | 141 | 136 | 12 | 130 |
| 1931 | 88 | 51 | 89 | 112 | 109 | 63 | 70 |
| 1932 | 71 | 36 | 62 | 62 | 60 | 36 | 39 |
| 1933 | 59 | 39 | 84 | 81 | 85 | 97 | 71 |
| 1934 | 59 | 42 | 127 | 89 | 93 | 79 | 93 |
| 1935 | 57 | 40 | 131 | 88 | 87 | 91 | 104 |
| 1936 | 59 | 43 | 119 | 97 | 89 | 106 | 121 |
| 1937 | 61 | 46 | 140 | 132 | 120 | 120 | 122 |
| 1938 | 63 | 48 | 105 | 106 | 104 | 93 | 100 |
| 1939 | 63 | 47 | 115 | 125 | 102 | 115 | 111 |
| 1940 | 63 | 48 | 133 | 124 | 110 | 99 | 96 |
| 1941 | 63 | 49 | 157 | 151 | 107 | 112 | 126 |
| 1942 | 65 | 49 | 175 | 163 | 110 | 150 | 192 |
| 1943 | | | | | | | |
| October | 65 | 50 | 180 | 163 | 110 | 144 | 191 |
| November | 65 | 50 | 180 | 163 | 110 | 144 | 191 |
| December | 65 | 50 | 211 | 163 | 110 | 144 | 191 |
| 1944 | | | | | | | |
| January | 65 | 50 | 211 | 163 | 110 | 144 | 191 |
| February | 65 | 50 | 211 | 163 | 110 | 144 | 191 |
| March | 65 | 50 | 211 | 163 | 110 | 144 | 191 |
| April | 65 | 50 | 214 | 163 | 110 | 144 | 191 |
| May | 65 | 50 | 223 | 163 | 110 | 144 | 191 |
| June | 65 | 50 | 223 | 163 | 110 | 144 | 191 |
| July | 65 | 50 | 223 | 163 | 110 | 144 | 191 |
| August | 65 | 50 | 223 | 163 | 110 | 144 | 191 |
| September | 65 | 50 | 223 | 163 | 110 | 144 | 191 |
| October | 65 | 50 | 223 | 163 | 110 | 144 | 191 |

# Wholesale Prices of Phosphates and Potash**

| | Superphosphate Baltimore, per unit | Florida land pebble 68% f.o.b. mines, bulk, per ton | Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton | Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports | Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports | Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports | Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1] | Kainit, 20% bulk, per unit, c.i.f. Atlantic and Gulf ports[1] |
|---|---|---|---|---|---|---|---|---|
| 1910–14 | $0.536 | $3.61 | $4.88 | $0.714 | $0.953 | $24.18 | $0.657 | $0.655 |
| 1922 | .566 | 3.12 | 6.90 | .632 | .904 | 23.87 | .... | .508 |
| 1923 | .550 | 3.08 | 7.50 | .588 | .836 | 23.32 | .... | .474 |
| 1924 | .502 | 2.31 | 6.60 | .582 | .860 | 23.72 | .... | .472 |
| 1925 | .600 | 2.44 | 6.16 | .584 | .860 | 23.72 | .... | .483 |
| 1926 | .598 | 3.20 | 5.57 | .596 | .854 | 23.58 | .537 | .524 |
| 1927 | .535 | 3.09 | 5.50 | .646 | .924 | 25.55 | .586 | .581 |
| 1928 | .580 | 3.12 | 5.50 | .669 | .957 | 26.46 | .607 | .602 |
| 1929 | .609 | 3.18 | 5.50 | .672 | .962 | 26.59 | .610 | .605 |
| 1930 | .542 | 3.18 | 5.50 | .681 | .973 | 26.92 | .618 | .612 |
| 1931 | .485 | 3.18 | 5.50 | .681 | .973 | 26.92 | .618 | .612 |
| 1932 | .458 | 3.18 | 5.50 | .681 | .963 | 26.90 | .618 | .591 |
| 1933 | .434 | 3.11 | 5.50 | .662 | .864 | 25.10 | .601 | .565 |
| 1934 | .487 | 3.14 | 5.67 | .486 | .751 | 22.49 | .483 | .471 |
| 1935 | .492 | 3.30 | 5.69 | .415 | .684 | 21.44 | .444 | .488 |
| 1936 | .476 | 1.85 | 5.50 | .464 | .708 | 22.94 | .505 | .560 |
| 1937 | .510 | 1.85 | 5.50 | .508 | .757 | 24.70 | .556 | .607 |
| 1938 | .492 | 1.85 | 5.50 | .523 | .774 | 25.17 | .572 | .623 |
| 1939 | .478 | 1.90 | 5.50 | .521 | .751 | 24.52 | .570 | .670 |
| 1940 | .516 | 1.90 | 5.50 | .517 | .730 | ..... | .573 | .... |
| 1941 | .547 | 1.94 | 5.64 | .522 | .780 | 25.55 | .570 | .... |
| 1942 | .600 | 2.13 | 6.29 | .522 | .810 | 25.74 | .205 | .... |
| 1943 | | | | | | | | |
| October | .640 | 2.00 | 5.90 | .535 | .797 | 26.00 | .200 | .... |
| November | .640 | 2.00 | 5.90 | .535 | .797 | 26.00 | .200 | .... |
| December | .640 | 2.00 | 6.10 | .535 | .797 | 26.00 | .200 | .... |
| 1944 | | | | | | | | |
| January | .640 | 2.00 | 6.10 | .535 | .797 | 26.00 | .200 | .... |
| February | .640 | 2.00 | 6.10 | .535 | .797 | 26.00 | .200 | .... |
| March | .640 | 2.00 | 6.10 | .535 | .797 | 26.00 | .200 | .... |
| April | .640 | 2.00 | 6.10 | .535 | .797 | 26.00 | .200 | .... |
| May | .640 | 2.00 | 6.10 | .535 | .797 | 26.00 | .200 | .... |
| June | .640 | 2.00 | 6.10 | .471 | .701 | 22.88 | .176 | .... |
| July | .646 | 2.16 | 6.10 | .503 | .749 | 24.44 | .188 | .... |
| August | .650 | 2.20 | 6.10 | .503 | .749 | 24.44 | .188 | .... |
| September | .650 | 2.20 | 6.10 | .503 | .749 | 24.44 | .188 | .... |
| October | .650 | 2.20 | 6.10 | .535 | .797 | 26.00 | .200 | .... |
| **Index Numbers (1910-14 = 100)** | | | | | | | | |
| 1922 | 106 | 87 | 141 | 89 | 95 | 99 | .... | 78 |
| 1923 | 103 | 85 | 154 | 82 | 88 | 96 | .... | 72 |
| 1924 | 94 | 64 | 135 | 82 | 90 | 98 | .... | 72 |
| 1925 | 110 | 68 | 126 | 82 | 90 | 98 | .... | 74 |
| 1926 | 112 | 88 | 114 | 83 | 90 | 98 | 82 | 80 |
| 1927 | 100 | 86 | 113 | 90 | 97 | 106 | 89 | 89 |
| 1928 | 108 | 86 | 113 | 94 | 100 | 109 | 92 | 92 |
| 1929 | 114 | 88 | 113 | 94 | 101 | 110 | 93 | 92 |
| 1930 | 101 | 88 | 113 | 95 | 102 | 111 | 94 | 93 |
| 1931 | 90 | 88 | 113 | 95 | 102 | 111 | 94 | 93 |
| 1932 | 85 | 88 | 113 | 95 | 101 | 111 | 94 | 90 |
| 1933 | 81 | 86 | 113 | 93 | 91 | 104 | 91 | 86 |
| 1934 | 91 | 87 | 110 | 68 | 79 | 93 | 74 | 72 |
| 1935 | 92 | 91 | 117 | 58 | 72 | 89 | 68 | 75 |
| 1936 | 89 | 51 | 113 | 65 | 74 | 95 | 77 | 85 |
| 1937 | 95 | 51 | 113 | 71 | 79 | 102 | 85 | 93 |
| 1938 | 92 | 51 | 113 | 73 | 81 | 104 | 87 | 95 |
| 1939 | 89 | 53 | 113 | 73 | 79 | 101 | 87 | 93 |
| 1940 | 96 | 53 | 113 | 72 | 77 | .... | 87 | .... |
| 1941 | 102 | 54 | 110 | 73 | 82 | 106 | 87 | .... |
| 1942 | 112 | 59 | 129 | 73 | 85 | 106 | 84 | .... |
| 1943 | | | | | | | | |
| October | 119 | 55 | 121 | 75 | 84 | 108 | 83 | .... |
| November | 119 | 55 | 121 | 75 | 84 | 108 | 83 | .... |
| December | 119 | 55 | 125 | 75 | 84 | 108 | 83 | .... |
| 1944 | | | | | | | | |
| January | 119 | 55 | 125 | 75 | 84 | 108 | 83 | .... |
| February | 119 | 55 | 125 | 75 | 84 | 108 | 83 | .... |
| March | 119 | 55 | 125 | 75 | 84 | 108 | 83 | .... |
| April | 119 | 55 | 125 | 75 | 84 | 108 | 83 | .... |
| May | 119 | 55 | 125 | 75 | 84 | 108 | 83 | .... |
| June | 119 | 55 | 125 | 66 | 74 | 95 | 80 | .... |
| July | 121 | 60 | 125 | 70 | 79 | 101 | 82 | .... |
| August | 121 | 61 | 125 | 70 | 79 | 101 | 82 | .... |
| September | 121 | 61 | 125 | 70 | 79 | 101 | 82 | .... |
| October | 121 | 61 | 125 | 75 | 84 | 108 | 83 | .... |

# Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

| | Farm prices* | Prices paid by farmers for commodities bought* | Wholesale prices of all commodities† | Fertilizer materials‡ | Chemical ammoniates | Organic ammoniates | Superphosphate | Potash |
|---|---|---|---|---|---|---|---|---|
| 1922..... | 132 | 149 | 141 | 116 | 101 | 145 | 106 | 85 |
| 1923..... | 142 | 152 | 147 | 114 | 107 | 144 | 103 | 79 |
| 1924..... | 143 | 152 | 143 | 103 | 97 | 125 | 94 | 79 |
| 1925..... | 156 | 157 | 151 | 112 | 100 | 131 | 109 | 80 |
| 1926..... | 145 | 155 | 146 | 119 | 94 | 135 | 112 | 86 |
| 1927..... | 139 | 153 | 139 | 116 | 89 | 150 | 100 | 94 |
| 1928..... | 149 | 155 | 141 | 121 | 87 | 177 | 108 | 97 |
| 1929..... | 146 | 153 | 139 | 114 | 79 | 146 | 114 | 97 |
| 1930..... | 126 | 145 | 126 | 105 | 72 | 131 | 101 | 99 |
| 1931..... | 87 | 124 | 107 | 83 | 62 | 83 | 90 | 99 |
| 1932..... | 65 | 107 | 95 | 71 | 46 | 48 | 85 | 99 |
| 1933..... | 70 | 109 | 96 | 70 | 45 | 71 | 81 | 95 |
| 1934..... | 90 | 123 | 109 | 72 | 47 | 90 | 91 | 72 |
| 1935..... | 108 | 125 | 117 | 70 | 45 | 97 | 92 | 63 |
| 1936..... | 114 | 124 | 118 | 73 | 47 | 107 | 89 | 69 |
| 1937..... | 121 | 130 | 126 | 81 | 50 | 129 | 95 | 75 |
| 1938..... | 95 | 122 | 115 | 78 | 52 | 101 | 92 | 77 |
| 1939..... | 93 | 121 | 112 | 79 | 51 | 119 | 89 | 77 |
| 1940..... | 98 | 122 | 115 | 80 | 52 | 114 | 96 | 77 |
| 1941..... | 122 | 130 | 127 | 86 | 56 | 130 | 102 | 77 |
| 1942..... | 157 | 152 | 144 | 93 | 57 | 161 | 112 | 77 |
| 1943 | | | | | | | | |
| October... | 192 | 170 | 150 | 95 | 57 | 160 | 119 | 78 |
| November. | 194 | 171 | 150 | 95 | 57 | 160 | 119 | 78 |
| December.. | 196 | 173 | 150 | 96 | 57 | 171 | 119 | 78 |
| 1944 | | | | | | | | |
| January... | 196 | 174 | 150 | 96 | 57 | 171 | 119 | 78 |
| February.. | 195 | 175 | 151 | 96 | 57 | 171 | 119 | 78 |
| March..... | 196 | 175 | 151 | 96 | 57 | 171 | 119 | 78 |
| April..... | 196 | 175 | 152 | 96 | 57 | 172 | 119 | 78 |
| May..... | 194 | 175 | 152 | 97 | 57 | 175 | 119 | 78 |
| June..... | 193 | 176 | 151 | 95 | 57 | 175 | 119 | 69 |
| July..... | 192 | 176 | 152 | 96 | 57 | 175 | 121 | 74 |
| August.... | 193 | 176 | 151 | 96 | 57 | 175 | 121 | 74 |
| September. | 192 | 176 | 151 | 96 | 57 | 175 | 121 | 74 |
| October... | 194 | 176 | 152 | 97 | 57 | 175 | 121 | 78 |

* U. S. D. A. figures.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning with June 1941, manure salts prices are F. O. B. mines, the only basis now quoted.

** The annual average of potash prices is higher than the weighted average of prices actually paid because since 1926 better than 90% of the potash used in agriculture has been contracted for during the discount period. From 1937 on, the maximum seasonal discount has been 12%.

# REVIEWS

**This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.**

## Fertilizers

*"Soil Fertilizers, Their Application and Function on Soils in Alaska," Matanuska Exp. Sta., Palmer, Alaska, Cir. 5, April 1944, Don L. Irwin.*

*"Sixth Annual Report of the Arizona Fertilizer Control Office," Agr. Exp. Sta., Univ. of Ariz., Tucson, Ariz., Sp. Bul., Jan. 1944.*

*"Amount of Commercial Fertilizers Used on Various Crops in California During July-December, 1943," Dept. of Agr., Sacramento 14, Calif., FM-95, Nov. 1, 1944.*

*"Tonnages of Mixed Commercial Fertilizers Used in California During July-December, 1943," Dept. of Agr., Sacramento 14, Calif., FM-96, Nov. 2, 1944.*

*"Kinds and Amounts of Commercial Fertilizers Used in California During July-December, 1943," Dept. of Agr., Sacramento 14, Calif., FM-97, Nov. 3, 1944.*

*"Fertilizer Recommendations 1945, Maritime Provinces of Canada," Maritime Fert. Council, Moncton, N. S., Canada, J. E. McIntyre.*

*"Fertilizing to Increase the Yield and Longevity of Alfalfa in Georgia," Ga. Exp. Sta., Experiment, Ga., Press Bul. 540, Oct. 5, 1944, L. C. Olson.*

*"Fertilizer Now for More Feed in Forty-Five," Dept. of Agr., Univ. of Me., Orono, Me., E. Cir. 204, Sept. 1944.*

*"Tonnage of Different Grades of Fertilizer Sold in Michigan Jan. 1 to June 30, 1944," Soils Sci. Dept., Mich. State College, East Lansing, Mich.*

*"Fertilizers for Young Tung Trees," Agr. Exp. Sta., Miss. State College, State College, Miss., Inf. Sheet 314, May 1944, S. R. Greer.*

*"Fertilizers for Fall Sown Crops," Agr. Ext. Serv., Univ. of Mo., Columbia, Mo., Cir. 510, Aug. 1944, Arnold W. Klemme.*

*"Better Wartime Use of Farm Manure," College of Agr., Cornell Univ., Ithaca, N. Y., Bul. 639, March 1944, A. F. Gustafson.*

*"Poultry Manures," College of Agr., Cornell Univ., Ithaca, N. Y., Bul. 641, March 1944, A. F. Gustafson and L. E Weaver.*

*"Farm Manure," College of Agr., Cornell Univ., Ithaca, N. Y., Bul. 642, March 1944, A. F. Gustafson.*

*"Fertilizer Sales in Ohio Jan. 1 to June 30, 1944," Dept. of Agron., State Univ., Columbus, Ohio.*

*"Inspection of Fertilizers," Agr. Exp. Sta., R. I. State College, Kingston, R. I., Cont. 658, March 1944, E. J. Deszyck and J. J. Havern.*

*"The Effects of Maturity, Nitrogen Fertilization, Storage and Cooking, on the Ascorbic Acid Content of Two Varieties of Turnip Greens," Agr. Exp. Sta., Baton Rouge, La., Southern Coop. Ser. Bul. 1, Nov. 1943.*

*"Ammonium Nitrate vs. Sodium Nitrate as Fertilizer for Cotton," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Cir. of Inf. 71, Feb. 8, 1944, C. A. Mooers.*

*"Fert. Tonnage Sales Report for Washington for July 1, 1941 to June 30, 1942," Agr. Exp. Sta., State College of Wash., Pullman, Wash. Mimeo. Cir. 10, July 1943; S. C. Vandecaveye.*

*"Drillability of Various Types of Ammonium Nitrate Fertilizers," Agr. Res. Adm., U. S. D. A., Beltsville, Md., Res. Rpt. 25, Sept. 1944, C. W. Whittaker, F. O. Lundstrom, J. Y. Yee, L. G. Schoenleber and G. A. Cummings.*

## Soils

*"Soil Improvement in Alabama," Ext. Serv., Ala. Polytechnic Inst., Auburn, Ala., Cir. 290, June 1944, J. C. Lowery and W. W. Cotney.*

*"Soil Building and Pasture Practices for Alaska," Matanuska Exp. Sta., Palmer, Alaska, Cir. 4, April 1944, Don L. Irwin.*

*"The Control of Soil Erosion in New York," College of Agr., Cornell Univ., Ithaca, N. Y., Bul. 438, June 1940 (Rev. June 1944), A. F. Gustafson.*

*"Investigations in Erosion Control and Reclamation of Eroded Land at the Central Piedmont Conservation Experiment Station, Statesville, N. C., 1930-40," U. S. D. A., Washington, D. C., T. Bul. 873, Aug. 1944, T. L. Copley, L. A. Forrest, A. G. McCall, and F. G. Bell.*

*"Land Settlement," Library, U. S. D. A., Washington, D. C., Library List 9, June 1944, Annie M. Hannay.*

*"Physical Land Conditions in Muskingum and Guernsey Counties, Ohio," U. S. D. A., Washington, D. C., Phys. Land Survey 32, 1944, C. L. Whiteford, A. H. Paschall, and E. C. Sease.*

## Crops

¶ Five-acre cotton contests have been conducted in South Carolina for 16 years and the results in 1943 are published in Clemson Agricultural College Circular 253 entitled "The Cotton Contest—1943." The State winner this year was W. G. Smith of Johnston in Edgefield county with the yield of 5,980 lbs. of lint. Mr. Smith used Coker 100 Wilt Resistant, Strain 2, and had a staple length of 1-1/16 inches. The circular points out that during the 16 years of these cotton contests, more than 12,000 five-acre fields have been entered. The steady improvement in the staple length of the lint is shown over this period with 97.7 per cent of the crop in South Carolina now running 15/16 inch or longer, compared to 53.3 per cent of the state in 1930. In this respect, South Carolina has the best record of the four southeastern states. In 1943, 90.5 per cent of the crop was one inch or longer, and again was better than the other states in this territory.

The practices followed by farmers in obtaining these record yields of high quality cotton are summarized, and recommendations based on the experience of these outstanding growers are drawn up. There is a definite tendency for rows to be narrow and spacing closer than in past years, and, the improved varieties are used in practically all cases. It has been found that the improved variety seed should be of known origin and not more than two years removed from the breeder. The seed should be treated to prevent diseases, and land should be carefully and thoroughly prepared with a firm seed bed.

Side-placement of the fertilizer in bands is desirable, but if this is not possible, it should be applied and bedded down 10 days before planting. In general, 400 to 800 lbs. of fertilizer per acre should be used, the amounts and analysis adapted to the conditions prevailing on each individual farm. It is stated that on the average a 4-8-6 fertilizer was used at planting time, supplemented with side-dressings so as to bring total plant food used to a 1-1-1 ratio. Nitrogen top-dressing at chopping time is usually necessary, and if rust has appeared on the previous crop, 50 to 100 lbs. muriate of potash or the equivalent should be used at chopping-out time. If legumes are turned under for cotton, nitrogen in the fertilizer can be reduced, and it is suggested that mixed fertilizers should be non-acid forming. On highly acid soil, lime should be used. Planting should be as early as possible, after danger from cold weather is past. Boll weevil should be controlled by appropriate applications of poison mixture, and harvesting should be done only when the cotton is thoroughly dry. The cotton should be ginned where equipment is in good condition and where care is taken to keep the seeds free from contamination. The experiences of these successful cotton growers can well be used for a guide for all growers in this section.

¶ Alfalfa is one of our most important forage crops from the viewpoint of quality, and in many parts of the country is rapidly becoming a most important crop from the viewpoint of acreage. At times, growers are discouraged due to unsatisfactory growth of the crop. In order to help correct this situation W. E. Colwell has compiled information on diseases that may adversely affect alfalfa, and makes suggestions on how to correct them. These are contained in Cornell Extension Bulletin 616 entitled "How to Recognize Some Common Alfalfa Troubles." In this publication, leaf spot, bacterial wilt, potash deficiency, boron deficiency, leafhopper injury, and snout-beetle injury are considered. Two color plates and excellent black and white photographs are of great value and assistance in recognizing and identifying the various troubles described. These are of great benefit, since some of the difficulties encountered on alfalfa are a little hard to distinguish at first

glance. With the descriptions and illustrations given by Dr. Colwell, a careful observer should be able to form a pretty good idea as to what is wrong with his alfalfa, provided it is one of the troubles covered in this publication. Leaf spot is a very serious trouble, but there is no practical control of it. It often can be reduced by early cutting. Bacterial wilt is devastating when it develops. The control usually recognized as helpful is to have a shorter rotation whereby alfalfa is not kept on the same field for such a long period of years, and to keep the field out of alfalfa at least two years between crops. Potash deficiency is due to an insufficient supply of available potash in the soil, and the characteristic symptoms are described and illustrated. This can be prevented or overcome by the use of 300 to 400 lbs. of muriate of potash per acre applied in the fall or early spring. It is stated that when seeding alfalfa on soils known to be deficient in potash, applications of 150 to 300 lbs. of muriate of potash per acre should be made at seeding time. Owing to the depletion of potash supplies in the soil caused by heavy crop removals of alfalfa, more attention has to be given to maintaining a sufficient supply of this nutrient in the soil.

Boron deficiency is due to a lack of sufficient available boron in the plant. When describing the typical signs of boron deficiency, the author is careful to distinguish between these and leafhopper injury, since the two are easily confused. In order to correct boron deficiency, it is recommended that about 30 lbs. of borax per acre be applied at any time during the year when the growth is short. Following the initial application, 10 lbs. per acre may be applied each year, in order to prevent the development of deficiency after it is once corrected. Leafhopper injury is best combated by cutting the crop early. Snout-beetle injury is localized and is usually taken care of by poison bait. This bulletin is of use and value to all alfalfa growers, since the troubles described are by no means confined to New York State.

¶ Another publication on alfalfa is Circular 560 of the Illinois Agricultural Extension Service. This was prepared by W. L. Burlison, D. Heusinkveld, and O. H. Sears. The publication's title is "How to Get Good Yields of Alfalfa." The use of alfalfa as a hay crop and as a pasture, the latter case preferably in mixtures with a grass, is described. The conditions necessary for getting a good crop are a soil with good drainage, a soil that is not acid, or one that has had the acid corrected by the use of lime, sufficient plant nutrients supplied by manure, phosphate, and potash, and proper inoculation of the seed, if it is not known that the soil already is inoculated with nitrogen-fixing organisms. It is brought out that phosphates increase alfalfa yields on many Illinois soils, while lack of potash is a limiting factor over wide areas in the southern third of the State, and in more areas over the other two-thirds of the State. These deficiencies can be corrected by the use of appropriate phosphate and potash fertilizers. Adapted varieties should be used, a well-prepared seedbed should be provided, and cutting should be made at the proper time and not too late in the season. Alfalfa diseases and insect pests are briefly considered. This publication is a good popular guide for growing alfalfa in the Midwest.

¶ Another legume that is valuable and popular, although more restricted in the areas in which it can be grown, is lespedeza. In order to give popular and practical information on growing this crop, the Illinois Extension Service has issued Circular 561 entitled "Lespedeza: Its Place in Illinois Agriculture." This was written by O. H. Sears and W. L. Burlison. While lespedeza will grow almost anywhere in Illinois, in the northern part of the State the late varieties will not reseed. This property of reseeding itself is one

of the valuable characteristics of lespedeza, and therefore varieties should be selected that will be sure to set seed in the area in which they are grown. While there are several lespedezas, two of the annual species are most commonly grown. One of these includes Tennessee 76 and Kobe lespedeza, while Korean, Harbin, and Early Korean belong to the other.

Lespedeza sericea is a perennial lespedeza and is becoming increasingly popular. Lespedeza is ordinarily used in Illinois as a pasture crop. It will grow on soils that are not adapted to growing alfalfa and the clovers, which has led many farmers to grow lespedeza on poorer soil without proper fertilization. This results in the soil being depleted even further of nutrients and in the production of low yields of poor quality forage. When used either for pasture or hay, soil acidity should be corrected by the use of limestone, and phosphate and potash should be applied to meet any deficiencies in the soil and to replace nutrients removed in the crop. It is brought out by the authors that there may not be as much response to fertilizers by lespedeza as by alfalfa and clover. There are soils, however, where applications of phosphate and potash are needed for maximum yields. Inoculation should be provided unless it is certain that the nitrogen-fixing organisms are present in the soil. Information on seeding, harvesting, and the few diseases and pests of lespedeza is briefly given.

*"All-Year Pasture System for Alabama," Ext. Serv., Ala. Polytechnic Inst., Auburn, Ala., Cir. 287, July 1944, J. C. Lowery and W. W. Cotney.*

*"Sedges and Rushes of Colorado," Agr. Exp. Sta., Colo. State College, Fort Collins, Colo., T. Bul. 32, May 1944, E. C. Smith and L. W. Durrell.*

*"Key to Some Colorado Grasses in Vegetative Condition," Agr. Exp. Sta., Colo. State College, Fort Collins, Colo., T. Bul. 33, June 1944, H. D. Harrington and L. W. Durrell.*

*"Poison Ivy and Its Eradication," Agr. Exp. Sta., New Haven, Conn., Cir. 160, July 1944, E. M. Stoddard.*

*"Yield Performance, Baking Qualities, and Seed-Source Studies of Certain Potato Varieties in Delaware," Agr. Exp. Sta., Univ. of Del., Newark, Del., Cir. 15, July 1944, E. P. Brasher.*

*"Annual Report, State Board of Agriculture 1943-1944," Dover, Del., Quar. Bul. 34(3), Sept. 1944.*

*"Annual Report Georgia Agricultural Extension Service 1943," Agr. Ext. Serv., Univ. System of Ga., Athens, Ga., Bul. 504, April 1944.*

*"Growing and Marketing Georgia Sweet Potatoes," Agr. Ext. Serv., Univ. System of Ga., Athens, Ga., Bul. 482, Rev. April 1944, W. C. Carter.*

*"Legumes of the Hawaiian Ranges," Agr. Exp. Sta., Univ. of Hawaii, Honolulu, Hawaii, Bul. 93, March 1944, E. Y. Hosaka, and J. C. Ripperton.*

*"Twenty-Sixth Annual Report," Ill. State Dept. of Agr., Springfield, Ill.*

*"On the Indiana Farm Front," Agr. Ext. Serv., Purdue Univ., Lafayette, Ind., A. R. 31.*

*"Sudan Grass," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., Leaf. 188 (Rep. Rev.), May 1944, R. R. Mulvey.*

*"Hemp Production Experiments, Cultural Practices and Soil Requirements," Agr. Exp. Sta., Iowa State College, Ames, Iowa, Bul. P63, June 1944, C. P. Wilsie, C. A. Black, and A. R. Aandahl.*

*"Noxious and Other Bad Weeds of Iowa," Agr. Exp. Sta., Iowa State College, Ames, Iowa, Bul. P64, June 1944, E. P. Sylvester and R. H. Porter.*

*"Vegetative Development of Inbred and Hybrid Maize," Agr. Exp. Sta., Iowa State College, Ames, Iowa, Res. Bul. 331, June 1944, M. E. Paddick.*

*"Depth and Methods of Planting Winter Cover-Crop Seed in Louisiana," Agr. Exp. Sta., La. State Univ., Baton Rouge, La., Bul. 375, March 1944, H. B. Brown, D. M. Johns, and C. B. Haddon.*

*"Weather Observations at the Rice Experiment Station, Crowley, La., for the Thirty-Three-Year Period 1910 to 1942, Inclusive," Agr. Exp. Sta., La. State Univ., Baton Rouge, La., Bul. 376, March 1944, J. Mitchell Jenkins.*

*"Rice Yields in Root Rot Areas Improved by Application of Fertilizer," Agr. Exp. Sta., La. State Univ., Baton Rouge, La., Bul. 379, June 1944, S. J. P. Chilton, W. A. Douglas, and T. C. Ryker.*

*"Forest Grazing in Relation to Beef Cattle Production in Louisiana," Agr. Exp. Sta., La. State Univ., Baton Rouge, La., Bul. 380, June 1944, R. S. Campbell and R. R. Rhodes.*

*"Composition and Uses of Blueberries," Agr. Exp. Sta., Univ. of Me., Orono, Me., Bul. 428, July 1944, F. B. Chandler.*

*"Sunflowers as a Crop," Agr. Exp. Sta., Mass. State College, Amherst, Mass., Bul. 415, June 1944, Karol J. Kucinski and Walter S. Eisenmenger.*

*"The Propagation and Identification of Clonal Rootstocks for the Apple," Agr. Exp. Sta., Mass. State College, Amherst, Mass., Bul. 418, Aug. 1944, J. K. Shaw.*

*"Culture of Field Beans in Michigan," Agr. Exp. Sta., Mich. State College, East Lansing, Mich., Sp. Bul. 329, May 1944, H. C. Rather and H. R. Pettigrove.*

*"Grapes in the Home Fruit Garden," Ext. Serv., Mich. State College, East Lansing, Mich., E. Fold. 71, May 1944.*

*"Practical Hints on Raspberry Growing," Ext. Serv., Mich. State College, East Lansing, Mich., E. Fold. 74, June 1944, R. E. Loree.*

*"Fiftieth Annual Report," Agr. Exp. Sta., Univ. of Minn., St. Paul, Minn.*

*"Highlights of the Work of the Mississippi Experiment Station," 56th A. R., 1943, State College, Miss.*

*"Sweet Potato Production," Agr. Exp. Sta., Miss. State College, State College, Miss., Bul. 402, June 1944, W. S. Anderson and J. W. Randolph.*

*"The Production of Sorgo Sirup in Mississippi," Agr. Sta., Miss. State College, State College, Miss., Cir. 122, June 1944, I. E. Stokes, J. F .O'Kelly, and E. B. Ferris.*

*"Edible Soybeans in Nebraska," Agr. Exp. Sta., Univ. of Nebr., Lincoln, Nebr., Bul. 356, March 1944, J. M. Slatensek and T. A. Kiesselbach.*

*"Annual Report of the Board of Control for the Fiscal Year Ending June 30, 1943," Agr. Exp. Sta., Univ. of Nev., Carson City, Nev., 1944.*

*"Summer Care of the Home Vegetable Garden," Agr. Exp. Sta., Rutgers Univ., New Brunswick, N. J., Cir. 485, June 1944.*

*"Composition of Range Grasses and Browse at Varying Stages of Maturity," Agr. Exp. Sta., College of Agr., State College, N. M., Bul. 311(Tech.), Dec. 1943.*

*"Research and Farming," Agr. Exp. Sta., State College of Agr., Univ. of N. C., Raleigh, N. C., 66th A. R.*

*"Bright Leaf Tobacco Curing," Agr. Exp. Sta., Univ. of N. C., Raleigh, N. C., Bul. 346, June 1944, E. G. Moss and N. C. Teter.*

*"Agronomy Suggestions for August," Agr. Ext. Serv., Univ. of N. C., Raleigh, N. C., 1944.*

*"Results of 1944 Official Variety Tests in North Carolina, Wheat-Barley-Oats," Agr. Exp. Sta., Univ. of N. C., Raleigh, N. C., Agron. Inf. Cir. 136, July 1944, R. P. Moore.*

*"Science for the Farmer," Agr. Exp. Sta., School of Agr., State College, Pa., Bul. 464, July 1944, 57th A. R.*

*"Annual Report 1942-1943," Agr. Exp. Sta., Univ. of P. R., Rio Piedras, P. R.*

*"Heredity and Environment in the Production of Hard Seeds in Common Beans (Phaseolus Vulgaris)", Agr. Exp. Sta., Univ. of P. R., Rio Piedras, P. R., R. Bul. 4, Feb. 1942, G. A. Lebedeff.*

*"Wartime Agricultural Research," Agr. Exp. Sta., Kingston, R. I. Cont. 659, June 1944.*

*"Corn Culture," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn. Cir. of Inf. 72, Feb. 21, 1944.*

*"Selecting Tomato Varieties for Vermont," Agr. Exp. Sta. Univ. of Vt., Burlington, Vt., Pamph. 10, March 1944, C. H. Blasberg.*

*"The College of Agriculture in Vermont, Its Functions, Facilities, and Needs," Univ. of Vt., Burlington, Vt., Oct. 1944, J. E. Carrigan.*

*"Report of the Commissioner of Agriculture and the State Board of Agriculture and Immigration," Va. Dept. of Agr. and Immigration, Richmond, Va., 1943.*

*"Grass and Grass-Alfalfa Mixtures for Beef Production in Eastern Washington," Agr. Exp. Sta., State College of Wash., Pullman, Wash., Bul. 444, June 1944, M. E. Ensminger, H. G. McDonald, A. G. Law, E. J. Warwick, E. J. Kreizinger, and V. B. Hawk.*

*"What's New in Farm Science," Agr. Exp. Sta., Univ. of Wis., Madison, Wis., Bul. 463, May 1944, Part 2, A.R.*

*"List of Bulletins of the Agricultural Experiment Stations for the Calendar Years 1941 and 1942," U. S. D. A., Washington, D. C., B. Bul. 4, Sept. 1944, Helen V. Barnes.*

*"Selected List of American Agricultural Books," Library, U. S. D. A., Washington, D. C., Library List 1, (Rev.), Sept. 1944.*

*"Guayule," Library, U. S. D. A., Washington, D. C., Library List 10, July 1944, Alan J. Blanchard.*

## Economics

*"How to Pick More Potatoes," Agr. Exp. Sta., Colo. A. & M. College, Fort Collins, Colo., Pres Bul. 98, Oct. 1944.*

*"The Marketing of Agricultural Products in Connecticut 1943," Bu. of Markets, State Dept. of Agr., Hartford, Conn.*

*"Choosing a Farm in Delaware," Agr. Exp. Sta., Univ. of Del., Newark, Del., E. Bul. 42, Oct. 1944, H. A. Johnson.*

*"Livestock and Feed Outlook for Illinois, 1944-45," Ext. Serv., Univ. of Ill., Urbana, Ill., AE. 2241, Aug. 1944.*

*"General Agriculture in the High Schools of Iowa," Agr. Exp. Sta., Iowa State College, Ames, Iowa, Res. Bul. 327, May 1944, J. A. Starrak and M. W. Kneedy.*

*"Statistical Investigations of Farm Sample Surveys Taken in Iowa, Florida and California," Agr. Exp. Sta., Iowa State College, Ames, Iowa, Res. Bul. 329, June 1944, R. J. Jessen and E. E. Houseman.*

*"The Coordination of Wheat and Corn Price Controls," Agr. Exp. Sta., Iowa State College, Ames, Iowa, Res. Bul. 330, June 1944, Geoffrey Shepherd.*

*"Agriculture of the Kentucky Pennyroyal Plain," Agr. Exp. Sta., Univ. of Ky., Lexington, Ky., Bul. 461, May 1944, D. L. McFarlane, E. J. Nesius, C. R. Sayre, and R. E. Graham.*

*"Financial Results of the Operation of Sugar Mills in Louisiana 1939, 1940 and 1941," Agr. Exp. Sta., La. State Univ., Baton Rouge, La., Bul. 373, March 1944, R. A. Ballinger.*

*"Farm Production, Farm Disposition, and Value of Barley 1909-41," U. S. D. A., Washington, D. C., Oct. 1944.*

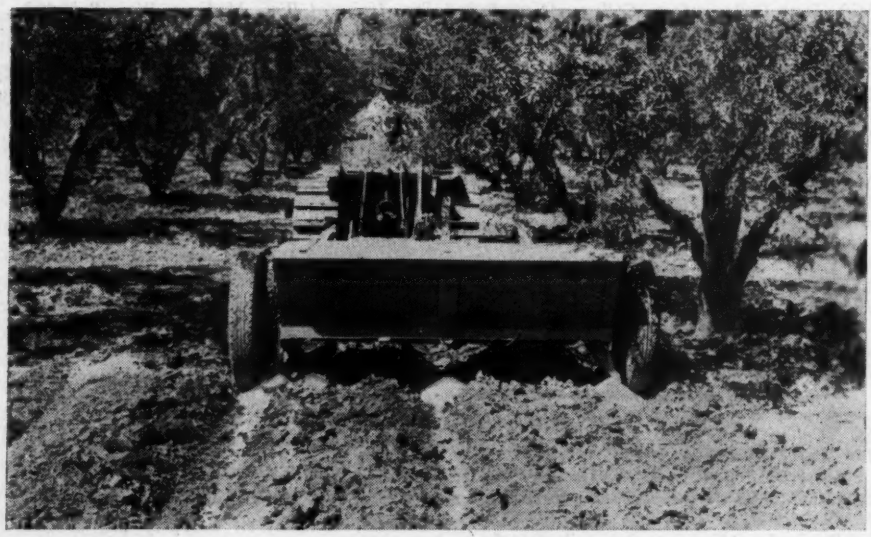
## Leaf Analysis—A Guide to Better Crops

(*From page* 14)

the fertilizer needs of tomato districts and in arriving at more effective fertilizer programs on individual plantings.

In the Eastern states chemical analysis of plant tissues has been extensively used as a guide in fertilizing the tomato crop for high yields and better quality.

Considering the wide use already found for it, and the rapidity with which it is being applied to various crops, leaf analysis is certain to furnish the grower a most valuable aid in solving plant nutrition problems and making fertilizer expenditures more effective.



**Leaf analysis as a guide to the effective application of fertilizer means higher yields and better quality.**

## Stumbling Blocks to Responses from Plow-Down Fertilizers

(*From page* 18)

noted (see Table 4) that whereas fertilizer treatments influenced yield a maximum of 6.2 bushels per acre, choice of hybrid, or germplasm, accounted for a range in yield of 57.6 bushels per acre.

Corn leaf blight was present by early August and spread rapidly from the lower leaves upward. By mid-August the top leaves of AxTr, the most susceptible hybrid, were carrying large leaf blight lesions. By early September most of the AxTr plants had been killed. The other hybrids also carried the infection but were apparently affected very little by it. Though the heavier potash treatment failed to improve the yield of AxTr significantly more than the other hybrids, stalk rot and stalk breakage averaged considerably less on the 10-10-20 strip than on the 10-10-0 strip.

The average percentage of broken stalks for the two locations where counts were made are given by treatment in the following table:

| *Treatment* | *Per cent broken stalks* |
|---|---|
| 10-10-0 | 17.2 |
| 0-10-10 | 11.2 |
| 10-10-10 | 11.4 |
| 10-10-20 | 8.5 |

From these limited observations it would be unsafe to conclude anything definite or to make sweeping generalizations on the basis of the results obtained. Possible explanations for suboptimum corn yields with heavy rates of fertilization are suggested. They are:

1. Lack of full acre stands of the crop plants. Uniform stands are too often mistaken for "full" stands. Actual counts showed that only 2/3 to 3/4 enough corn plants occupied the land on these Ohio farms applying fertilizer at heavy rates. The "test" for a "full" stand of corn is an ear-weight of 0.5 pound—not more.
2. Disease or insect damage. Yields can be so reduced under heavy insect or disease damage that the effects of good nutrient supply may be nullified.
3. Germplasm. Irrespective of its ability to tolerate insects or diseases, the potential capacity of a crop strain to produce will eventually, if not immediately, influence the amount of nutrients needed.
4. Competition by weeds. Nutrients and moisture consumed by weeds don't feed the crop. Deep placement of nutrients, especially nitrogen, will encourage weed growth less and make weed control easier. A full stand of the crop plants also reduces the opportunity for weed growth.
5. Lack of "balance" among the nu-

TABLE 4.

Acre yields in bushels of shelled corn at 15½ per cent $H_2O$ content are given in the body of the table, the per cent broken stalks in ( ).

Previous crop: Sweet clover-red clover pasture which carried one animal unit per acre in 1942.

Manure applied: None in addition to that produced on pasture.

Row fertilizer: 150 pounds of 0–12–12 per acre.

Date planted: May 29, 1943. This was slightly later than normal for the area. Blight severely damaged the AxTr. Average stand per acre 13,100 plants. (Weight of ears per plant .51 pound.)

| Hybrid | Plow-down treatment | | | | | |
|---|---|---|---|---|---|---|
| | 800 lbs. 10–10–0 | 800 lbs. 0–10–10 | 800 lbs. 10–10–10 | 800 lbs. 10–10–20 | Nothing plowed down | Average |
| U. S. 13 | 120.8 (3.8) | 121.2 (5.4) | 119.3 (.9) | 117.5 (.9) | 115.0 (1.8) | 118.8 (2.6) |
| Ohio W36 | 105.3 (4.7) | 110.2 (5.4) | 105.9 (4.5) | 105.1 (0.0) | 99.8 (4.8) | 105.3 (3.9) |
| AxTr | 57.7 (66.7) | 57.6 (33.7) | 69.0 (47.3) | 64.7 (39.2) | 57.2 (7.1) | 61.2 (38.8) |
| Iowa 939 | 93.8 (21.5) | 98.8 (14.7) | 96.4 (15.5) | 97.3 (2.9) | 94.1 (7.5) | 96.1 (12.4) |
| Average | 94.4 (24.2) | 97.0 (14.8) | 97.7 (17.1) | 96.2 (10.8) | 91.5 (5.3) | |
| Gain in yield | 2.9 | 5.5 | 6.2 | 4.7 | | |

**Left: Ears as harvested from Ohio W36, one of the blight-tolerant hybrids used in these comparisons. Right: Representative ears of AxTr showing the influence of serious leaf blight injury.**

trients supplied. (One pill may be beneficial but half a box of the same may be detrimental.) With heavy rates of added nutrients via the fertilizer bag, the grades customarily used in small amounts may not only fail to give expected yield increases, but may actually destroy a needed nutritional balance to the extent that enough harm is done to completely wipe out a fertilizer response.

## Fitting Practices to Soil Conditions

(*From page* 26)

**Seeding legumes in grain requires no special seedbed preparation.**

been plowed. Man not only has learned how to improve on nature's plan, but also how to maintain this improvement.

A decline in crop yields can be attributed to poor soil management practices such as using too many row crops or not enough meadow crops in the rotations, burning crop residues, failing to supply lime and other mineral plant foods, faulty seedbed preparation, excessive soil and water losses, and other factors.

While a three-phase program (active organic matter, mineral replacement, and erosion control) works satisfactorily in the Corn Belt, it may not work successfully in other areas.

Since problems and conditions in the various soil regions are different, management of the soil and erosion-control methods must be different. Measures and practices which are applicable under one set of conditions may not be applicable under another. More research is needed for the improvement of tillage implements, for the production of new crop strains and varieties, and for the development of better cultural methods.

Sweeping recommendations lead to misunderstanding and embarrassment. It is only by thorough study of facts, careful experimentation, and actual experience that our system of agriculture has developed and will be made to endure permanently.

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## Blue Lupine Is a Valuable Legume

(*From page* 10)

seed seem to shatter worse than others, probably due to atmospheric conditions more than anything else. This tendency to shatter limits the acreage that can be harvested with one combine. Farmers who grow large acreages for seed usually plant at several dates, thereby extending the harvesting period for a few days.

Mr. Warner gives a timely warning about the handling of seed after harvesting. He says, "In gathering lupine seed care should be taken to have as few green seed as possible. If there are any green seed when harvested, it is important to spread them not more than 8 to 10 inches deep and stir them every day for 3 or 4 days. Without further stirring seed may be left 10 days or 2 weeks to dry more thoroughly before sacking or placing in large piles. It is important that seed be spread on dry floors that will not "sweat" and keep the seed moist. Where green seed are present, they should not be carried over night in the sacks."

Mr. Warner's warning about drying seed is extremely important. In several cases growers who harvested large quantities failed to spread the seed for drying. When ready to market, germination tests showed the seed to be practically worthless. It is best to play safe and spread seed within a few hours after harvest.

The question often is asked about the northern limits of blue lupine. Although this is not known exactly, experience to date indicates that U. S. Highway 80 in Georgia and Alabama is near the northern limit of its climatic range. So little success has been had with lupine in Mississippi, however, that no statement can be made about its climatic range there.

Lupine seedlings in their earlier stages of growth have suffered varying degrees of damage from disease, particularly damping-off. In most instances the damage has been light enough that sufficient plants for a fair stand survived. Studies of various seed treatments for disease control on lupines are being conducted by the Bureau of Plant Industry, Soils, and Agricultural Engineering, and the Florida and Georgia Agricultural Experiment Stations.

Disease damage does not seem to be intensified where lupine is planted several successive years on the same land. D. L. Henderson, Pinckard, Alabama, planted the fifth successive crop of lupine on a field of sandy soil in the fall of 1943. When examined in January 1944, lupine plants in this field showed no more evidence of disease than those in other fields where lupine was growing for the first time.

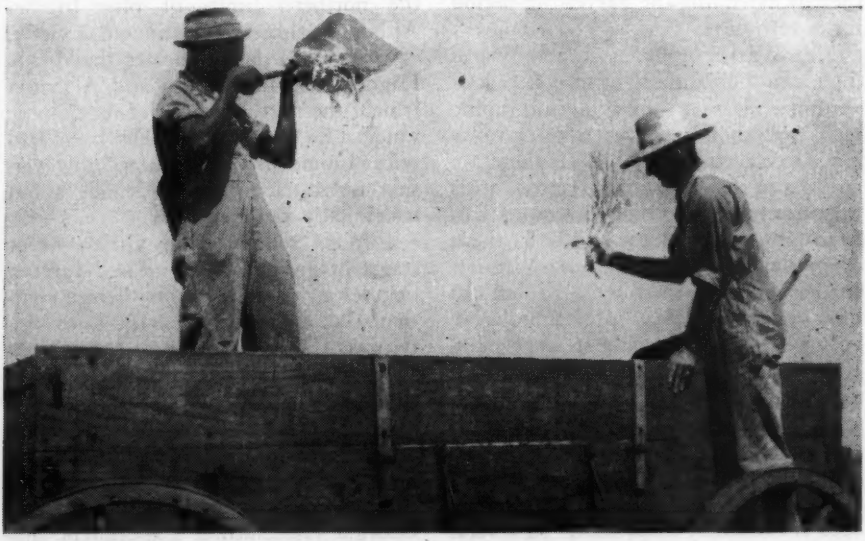
There has been considerable damage to stands by rabbits in small seed patches. Rabbits cut the lupine plants off at the ground, eat the stems, and leave the foliage on the ground. Rabbit damage is not important where several acres are planted to lupine.

Blue lupine is classed as a toxic plant, but is not highly palatable and no record is known of livestock being poisoned as a result of eating the green foliage. One case was reported of a goat getting into a barn and eating enough seed from a bag to cause death. Several cases have been observed where cattle grazed the green plants where other green feed was not available. The animals did not show any ill effects from eating the lupine.

Providing some kind of winter cover for land following the harvesting of peanuts is a serious soil conservation problem that has been intensified by the war. Blue lupine that was planted in the fall of 1942 showed much promise as a cover crop for peanut land. It has remarkable ability to grow under the adverse conditions of fall drought and of hogs gleaning the peanuts that remain in the ground when runner peanuts are dug.

Satisfactory stands usually have resulted where lupine seed was sown just ahead of the peanut digging plow in September or early October. Inoculation of plants was sometimes "spotty," where light digging plows failed to cover lupine seed completely. Where the plants got a fair start while peanuts were stacked in the field, the hogs did not destroy the plants when they were turned in to glean the fields after peanuts were picked. If allowed to develop deep roots before hogs are turned in, the lupine plants can take a surprising amount of punishment. Where hogs were turned in soon after planting, severe damage to stands often resulted.

Based on its performance the past two years, blue lupine promises to be the best winter legume for planting after harvested peanuts. Farmers in the Wiregrass Soil Conservation District in



**Threshing lupine seed by hand.**

**F. P. May, Quincy, Florida, is turning blue lupine for corn, Feb. 23, 1944.**

southeast Alabama were so favorably impressed with lupine planted after peanuts in 1942 that they planted an extensive acreage when they harvested peanuts in 1943. Luckily the largest peanut acreage is in the section where blue lupine has made satisfactory growth.

Most of the blue lupine grown in the Southeast has been harvested for seed. Enough of it has been turned under for succeeding crops, however, to show that yields of other crops following lupine compared favorably with those after other winter legumes.

As an example of the yields following lupines, F. P. May, Quincy, Fla., said, "I had a sandy field known as the old Smith field that had been making 5 to 8 bushels of corn per acre. In the fall of 1940, I sowed 40 pounds of lupine seed per acre and turned it under the latter part of the following March and planted corn. In 1941, my corn yield was about 14 bushels per acre. Each fall since then I have sown this field to blue lupine and followed the lupine with corn. In 1942 my yield was 36, and in 1943, 45 bushels of corn per acre. I did not use any more fertilizer for the corn than I did back in 1940.

"I save my own lupine seed. The first year we gathered seed by hand and since then we have used a combine. This spring we saved about 12,000 pounds from 14 acres. Due to extended dry weather in the fall of 1943 we did not get to plant as early as usual, so we planted 80 pounds of seed per acre where we had been planting 40 pounds. We planted 120 acres this year."

The consistently large yields of blue lupine seed have suggested the possibility of industrial uses of the seed in the future. Since the seed of the strain of blue lupine being grown in the South contains a poisonous alkaloid, it has no possibilities as a feed for livestock. There may be other industrial possibilities and it is hoped that these will be investigated.

The recent development of non-alkaloid strains of blue lupine reported in Farmers' Bulletin 1946, Lupines, New Legumes for the South, suggests several possibilities. If alkaloid-free lupines are palatable and have growth and seeding habits comparable to the strain of blue lupine now being grown in the South, they may become important sources of both forage and concentrates for livestock feeding.

It may be well to consider, however, that the development of such strains may have certain disadvantages. Un-

palatability of the present strain of blue lupine gives this plant a distinctly practicable advantage as a soil-conserving crop. It makes sufficient growth for early turning under, even when livestock are in the fields during the winter, whereas, the palatable legumes often are grazed so closely that they make little growth before livestock are removed and spring plowing begins. This advantage has been particularly apparent where blue lupine and several other winter legumes and small grains have been planted on different parts of the same fields as ground covers following the harvesting of peanuts.

Blue lupine has been used successfully in conditioning land for pastures in northern Florida. Bermuda grass has grown vigorously following lupine that was harvested for seed. The residue from the combine has furnished both mulch and nitrogen, which benefited the grass.

Blue lupine has been grown with sufficient success in Florida and southern Georgia and Alabama that it can no longer be considered as a "morning glory." It has a future in this section and promises to be a major contribution to the agriculture of the peanut belt of the deep South.

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## Lime Is the Key to Potash Efficiency

(*From page* 22)

lime must be used with fertilizers and not in place of them. In the case of nitrogen, liming frequently lessens the need for its application in the form of commercial fertilizer. Lime improves the condition of the soil, allowing legumes and microorganisms to take from the air a large part of the nitrogen needed for production of the crops. Such is not the case with phosphoric acid and potash, which can come only from the fertilizer material added and from the supply in the soil. With an increased yield, the amount of phosphoric acid and potash removed from the soil increases proportionately. If this added amount removed by the increase in crop yield is not compensated for by increased applications to the soil, a depletion of the reserve supply in the

**Many plants show easily recognized signs of plant-food starvation. White clover indicates an acute lack of potash by white spotting around the leaf edges. Similar symptoms of potash deficiency are common to practically all members of the clover family.**

soil takes place. Such a depletion of the reserve can be excused only in cases where phosphoric acid or potash cannot be obtained in adequate amounts, or where their price relationships are such that the increased value of the crops will not pay for the fertilizer added. If the reserves of phosphoric acid and potash are depleted when they are scarce or when the price relationship is unfavorable, then these reserves should be built up when they are plentiful and when price relationships are favorable.

Another one of the "ifs" in regard to the use of lime is that the effect of the lime on corn and small grain, grown in a rotation such as the one described here, is largely an indirect effect. In other words, the lime applied to the soil causes a great increase in the yield of clover. The benefit to the soil of the extra clover stubble and refuse added to the soil where the clover yields are great is responsible for the greater part of the increase in corn and wheat. Such increases are just as real as if they were direct, but one should recognize that such increases in the yields of wheat and corn from the use of lime would not be expected to occur where the lime was added for the first time just before the corn or wheat was seeded.

A very important rule in regard to liming is to lime according to the needs of the soil and the crop. No two soils have the identical lime requirement, nor do any two crops, so in the process of liming, both should be considered if lime is to play its part.

---

## Anti-Acre Aches

(*From page* 5)

more modern implements and better soils. Hence, fewer men per hundred acres can be expected to earn a safe livelihood where mechanical power and soil resources are greater. To the north in the cut-over meager spots of slow development, the handicaps are mostly that the land has been officially zoned and the better part of it is more profitable for hunting, fishing, and summer resorting than for agriculture.

Much of this northern country of all the Lake States region experienced panic, distress, and tax delinquency in the period following World War No. 1. One of the best informed extension men who knows this whole territory of zoned lands like a book is definitely opposed to allowing sentiment to cloud our vision in respect to encouraging wholesale farm settlement in this last area of raw country.

He agrees that some soldiers and defense workers will choose to carve out farms and live in the midst of wild life like the old pioneers, while others will seek its climate to escape from industrial living conditions.

These adventurers would be in the minority out of any large body of veterans, he thinks. To those others who seek a steady and reasonable return from farming as the main endeavor of their lives, this man urges a close scrutiny of roads, markets, soil types, degree of stoniness, drainage, frost hazards, and the cost of land-clearing and the tools and equipment needed to wrestle with the devil among the stumps.

But, he warns, just about the time when a beginner has spent his wad in this manner his danger is greatest. Just as he has become ready with his tools and fences and raw land, maybe some of it on borrowed capital, the bottom may drop out of farm prices and his hopes will be sunk.

His best advice on the whole seems to be that the best opportunity for re-

turning war workers of all kinds is to invest in developed or partly developed farms in the older areas of the state where the years of costly pioneering and exploitation have passed. Yet as I remarked before, it is in these more settled sections that the land will support fewer operators without creating a burdensome surplus.

So far we haven't seen much evidence of all the various public and private loan agencies getting together for a talkfest and a little agreement between them on certain sane rules which could reasonably be adopted to stave off future acre aches.

Some critics of the government loan systems point out that they have been apt to act on the baling-out theory, the relief angle or the coddling attitude toward clients. On the other hand, private loan agencies have not always given full opportunity to the borrower, leaning towards the lender in administrative details, and have palmed off a lot of poor soil on good men and likewise good soil on inexperienced men.

One governing clause of a federal loan agency which bears attention these days reads: "No loan shall be made for acquiring any farm unless it is of such size as will be sufficient to constitute an efficient farm-managerial unit, and to enable a diligent farm family to carry on successful farming thereon."

HERE we have a sort of floor to keep the farm in mind from being too small and a ceiling to prevent it from being too large. In regard to oversized acreages, the idea is that no unit should be sold without reference to the ability of the man's family to work it well without many outside labor bills, or the requirement of a tenant to supplement the labor of the owner.

Long-time earning capacity on the basis of general average, long-range prices for farm products, plus enough modern equipment and power to enable the operator to keep step with the times and not become a helpless hillbilly, are added thoughts in any careful defense against acre aches.

In regard to reasonable standards of living, to which returning war workers and veterans are entitled, some old ideas held vainly by grasping landlord and capitalist must be ventilated. The standards long considered good enough no longer meet the modern demand. Access to ozone and early rising to see the dewy grass reflect the shining sun are not quite enough compensation these days for a life of toil and uncertainty. Youth has come up from childhood in an environment different from that of your hard-fisted old landlord. Likewise some of the heroes will be rather inclined to want a little luxury by the fireside to help pay off the hardships of war. And why not?

IN the same way farm operating costs are higher and more variable than they were in other times. Something on depreciation has to be reckoned, of course, and we always have taxes and insurance to settle out of the milk checks, as well as a snug sum ready to handle the loan on farmstead and chattels.

But when it comes to measuring this business by that old yardstick of the family-sized farm, we often learn to our dismay that the yardstick is rubber. It stretches and contracts. A guy buys a farm and has two kids under twelve. Ten years more and that farm may be too small, or if he is left alone with Ma, it may be too large—whatever he thought it was to begin with. In desperation he sells a chunk of it and divides the acreage. Now neither portion is suitable for a so-called family unit. So maybe he sells his part next year to the same man, who also buys another piece of a neighbor. This leaves the second party with more land than he can work with on the family-sized model.

To get out from under, the second man disposes of the farm for an inflated price instead of on its real earning capacity. The one who takes the

bait had it measured up to his family all right, but how to make a good living and pay off the inflated valuation remains a mystery to him until all his sons are gone and they sell him out at auction. So there you are, folks!

I am aware that the term "family-sized" farm, so often used to decorate long-winded resolutions in stuffy halls where rural groups gather for indoor sport, is one that was coined to fight against the encroachments of the corporation.

IT really doesn't mean an awful lot simmered down to ordinary rural community experience, because the family out there has shrunk so fast that nobody ever builds those three-holers anymore. If your present fenced-in borders take in too much territory to handle easily, you can hire somebody's boy awhile. If the boy is not available you can "seed her down," and quit milking. If the contrary happens and the family is too big to fit the farm, why my neighbor needs a good hired man, so let's accommodate him.

Nothing whatever seems to be gained in such a region of restricted infant appearances by merely buying or selling off chunks of land. Besides it's a mess of bother just to match up the men and the manor, so as to retain the family-sized model. So we have to go slow in advocating use of this highly-prized recipe for success in our campaign to satisfy the land-hungry heroes. Still more unfortunate is its use in an unwelcome depression. That's when the trek back to the land begins with all the ardor of the Cherokee strip affair—and how in tunkins can you shift original family-sized units around over night to meet such an emergency or judge how long the old-home-week celebration will last?

To sum it all up, it seems to me we should set us up another alphabetical agency. Let's call it SSA, meaning by this, Selective Settlement Authority. Probably we should appoint the main squeezes of the existing federal loan agencies to its board of directors and policy makers. Or maybe just try it out awhile in some state willing to be a guinea pig. Take some state with plenty of husky, ambitious lads fresh from rigorous outdoor pursuits in pursuit of the Japs, and with ample land left for younger men to tackle. It won't be hard to find such a state because they reckon now that over a third of the operating farmers are at least sixty years old and getting older. No use sending explorers away to locate claims in some God-forsaken wilderness, just in the hopes that Europe will be anxious to buy everything we can coax out of the ground.

But even in these tamer regions of established settlement which have been exposed to the vagaries of agricultural progress for a century, you'll need a true guide and index, a soil auger and a Scotch pocketbook. You'll need some advice from our SSA boys just as much as though you tried to farm Coney Island.

BUT to get back to what I intended to say, to stick to my text as it were, I am going to be awful hard to convince when they start claiming that every lad who says he was raised on a farm is entitled to go back to one, loan or nothing.

Don't forget we need somebody to stay in town and show those half-baked apprentices how to run machinery, and nobody can beat a farm boy at that business. And while he is there, no doubt he will raise as big or bigger a family as he would have if he stuck to the farm, and that means customers. Paying customers too, not exchange help customers like we have in the country!

Meanwhile we can forget this whole thing long enough to go and eat a genuine family-sized dinner, which I shall do at Christmas in my usual hefty style, pausing once more after many similar holidays to extend you one and all my heartfelt greetings.

DAD KNOWS

Smith—"What would you say is the most effective factor for redistributing wealth?"

Jones—"From my own experience, I'd say, wives, daughters, and sons!"

---

Rose's are red,
Violet's are blue,
Lily's are white—
I know. I saw them on the washline.

---

A mother received a letter from her son who is in the navy.

"Dear Ma: I joined the navy because I admired the way the ships was kept so clean and tidy. But I never knew until this week who keeps them so clean and tidy.—Love, Junior."

---

GOB HUMOR

Girl: "I'm afraid dad always turns out the lights at 12 o'clock."

Gob: "What a good sport he must be!"

---

Jeanie—"Why did you quit teaching school to join the chorus?"

Queenie—"Well, I think there's more money in showing figures to the older boys."

---

LOST

Mother (to young son)—"Whose little boy are you?"

Son (disgustedly)—"Gosh! don't tell me you don't know."

---

Famous Last Words: "Well, if he won't dim his, I won't dim mine."

A colored maid was asked if she was going to hang up any mistletoe this Christmas. "Not me," she replied, "deed I isn't. I got too much pride to advertise for de ordinary cou'tesies a lady have a right to expect."

---

Americans are different from all other races about drinking. The English prefer ale, the French wine, the Germans beer, the Irish whiskey, but the American has no choice as he drinks the whole darned business, whichever he can get to first.

---

Women snore, too.

---

SETTLED

Old Maid: "I can't decide between the divan and the arm chair."

Clerk: "Lady, you can't make a mistake on a nice comfortable chair like this."

Old Maid: "O. K., I'll take the divan."

---

"Sit down in front!"
"I don't bend that way."

---

ACTIVITY—FOR LIFE

If you have any idle time on your hands, take up pipe-smoking and you'll never have another idle moment, what with cleaning, filling, lighting, packing, loosening, relighting, tamping, puffing, cleaning, filling, etc., etc.

---

A Short Story, entitled "Three Generations." Grandfather had a farm. Father had a garden. Son had a can opener.

*Need for—*

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Fertilizing Small Fruits (Pacific Coast)
Better Corn (Midwest) and (Northeast)
Fertilize Pastures for Better Livestock (Pacific Coast)
Of Course I'm Interested (Pastures, Canada)
Meet the Family (Canada)

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N-9 Problems of Feeding Cigarleaf Tobacco
T-9 Fertilizing Potatoes in New England
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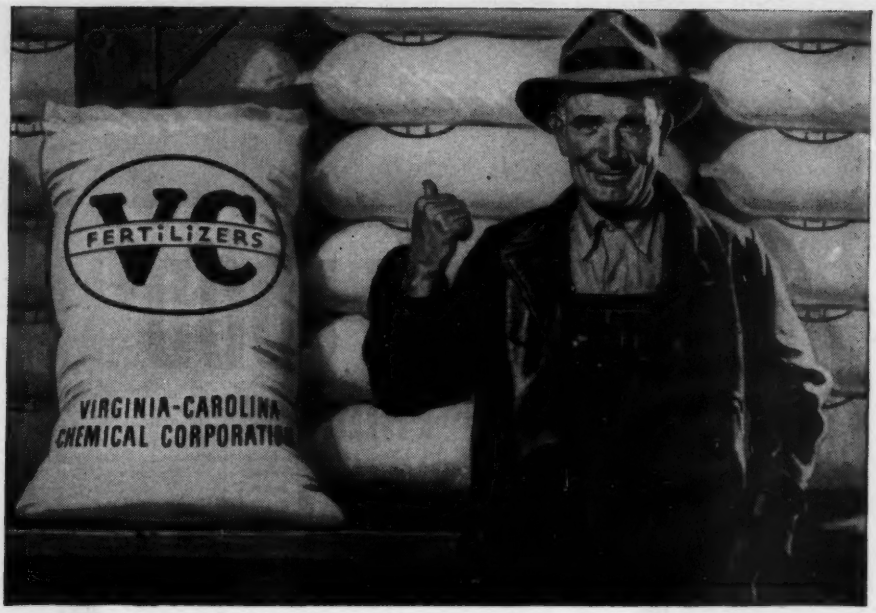


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